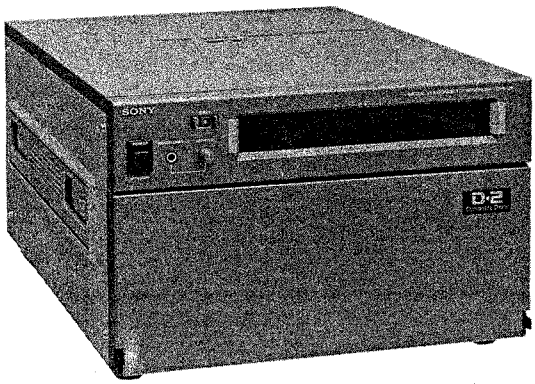
SONY

DIGITAL VIDEOCASSETTE RECORDER

DVR-20



D-2

Composite Digital

MAINTENANCE MANUAL

Volume 1 1st Edition (Revised 1)

Serial No.10001 and Higher

SAFETY CHECK-OUT

After correcting the original service problem, perform the following safety checks before releasing the set to the customer:

Check the metal trim, "metallized" knobs, screws, and all other exposed metal parts for AC leakage. Check leakage as described below.

LEAKAGE TEST

The AC leakage from any exposed metal part to earth ground and from all exposed metal parts to any exposed metal part having a return to chassis, must not exceed 3.5mA. Leakage current can be measured by any one of three methods.

1. A commercial leakage tester, such as the Simpson 229 or RCA WT-540A. Follow the manufacturers' instructions to use these instruments.
2. A battery-operated AC milliammeter. The Data Precision 245 digital multimeter is suitable for this job.
3. Measuring the voltage drop across a resistor by means of a VOM or battery-operated AC voltmeter. The "limit" indication is 5.25V so analog meters must have an accurate low-voltage scale. The Simpson 250 and Sanwa SH-63Trd are examples of a passive VOM that is suitable. Nearly all battery operated digital multimeters that have a 20V AC range are suitable. (See Fig. A)

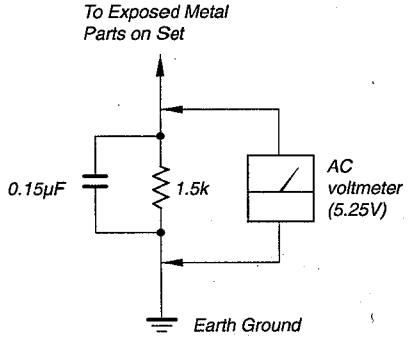


Fig. A. Using an AC voltmeter to check AC leakage.

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(Section 9, 10, 13 and 16 will be available as a Supplement.)

Volum-2

17. BLOCK DIAGRAM

(Section 17 will be available as a Supplement.)

18. SCHEMATIC DIAGRAM

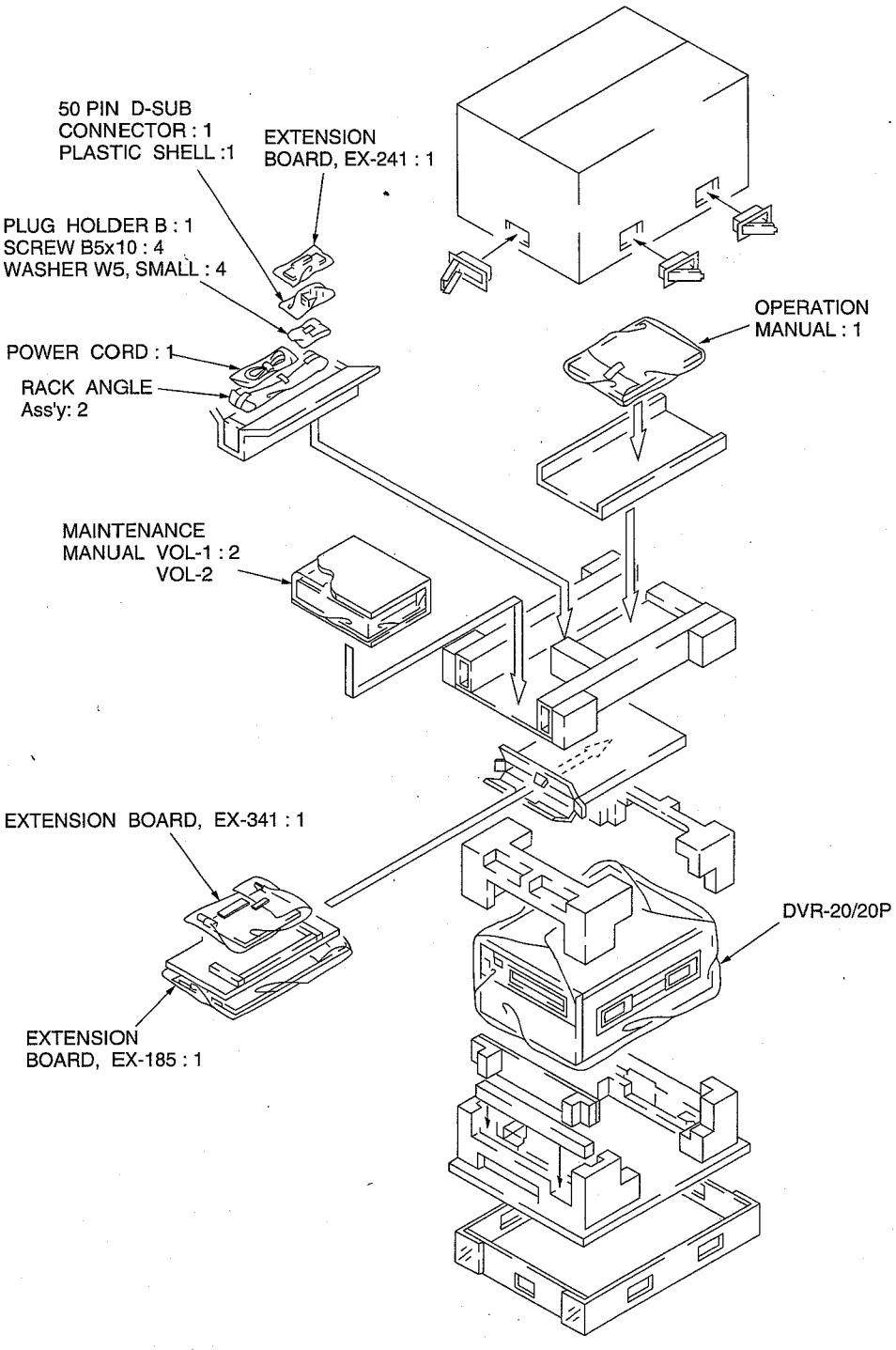
19. BOARD LAYOUT

20. SEMICONDUCTOR PIN ASSIGNMENT

21. REPLACEABLE PART

SECTION 1
INSTALLATION

1-1. UNPACKING AND REPACKING



1-2. SUPPLIED ACCESSORIES AND OPTIONAL ACCESSORIES

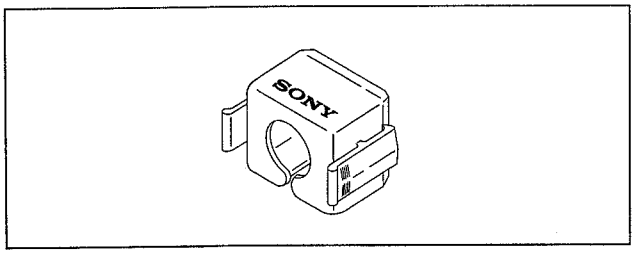
1-2-1. Supplied Accessories

Right Rack Angle Ass'y (6U) : 1
Left Rack Angle Ass'y (6U) : 1
Used for mounting DVR-20 in the rack.

Screw (B5x10) : 4
Washer (W5, SMALL) : 4
Used for mounting DVR-20 in the rack.

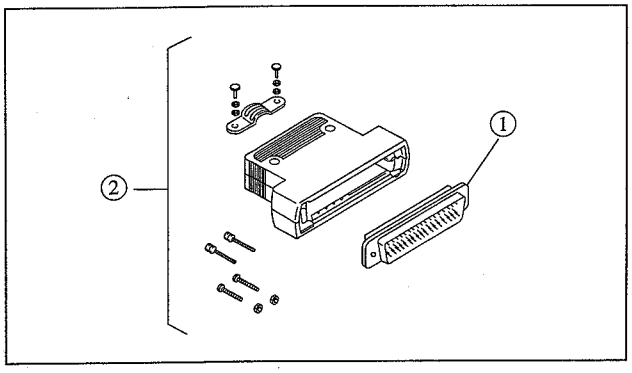
Power Cord: 1

Plug Holder B: 1
Used to secure the power input connector.



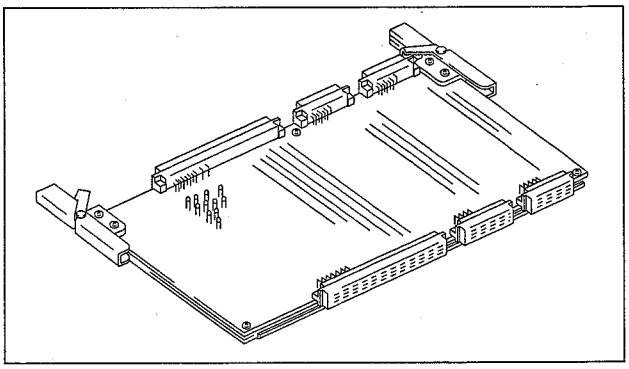
50 pin D-sub Connector (Male) : 1
This is the plug for the PARALLEL I/O connector used for connecting the parallel type remote controller to DVR-20.
It consists of:

① 50 pin D-sub connector (Male): 1
② Plastic Shell: 1



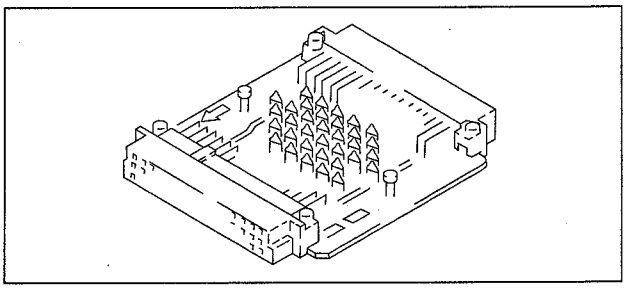
Extension Board: EX-185: 1
EX-241: 1
EX-341: 1

EX-185 board is used for checking or repairing the following circuit boards.
AE-15, DT-16, EQ-29, SV-133, SP-15 and SY-165 boards

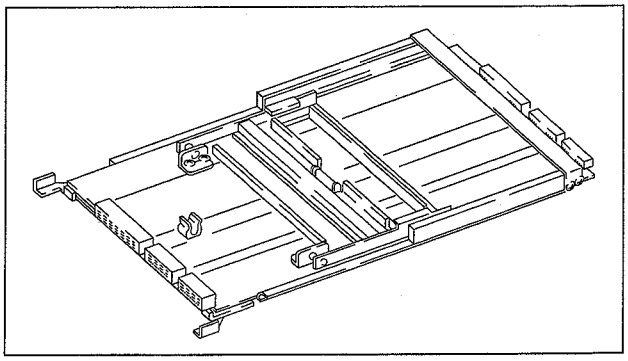


EX-241 board is used for checking or repairing the following circuit boards.

REC-11 board



EX-341 board is used for checking or repairing the following circuit boards.
AD-73, DE-37/36, EN-99, MD-50, and PR-157/163 boards



Operation Manual: 2
Maintenance Manual: 2
VOL-1 and VOL-2 are provided with the unit..

1-2-2. Optional Accessories

Control Panel: BKDV-201
Control Panel: BKDV-200
Control Panel: BKDV-101
Remote Control Adaptor (for BKDV-201/200/101) : BKDV-102
Serial Interface Board: BKDV-205/206
Video Controller: BKDV-108
Rack Mount Rail: RMM-18DV
Sony Digital Video Cassette S, M Type: DCS/DCM
Cleaning Cassette: DCS-12CL or DCM-12CL
Digital Video Cable (D-sub 25-pin) : VCD-2D/5D/10D/30D
Digital Audio Cable (XLR 3-pin) : ECD-3C/10C/30C
Remote Control Cable (D-sub 9-pin) : RCC-5G/10G/30G
IEEE-488 Cable (24-pin) : SMK-0032

1-3. POWER REQUIREMENT

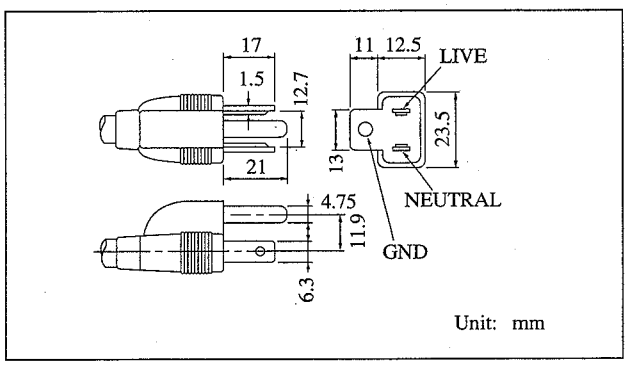
1-3-1. Capacity of AC Power Source

Power Line Voltage:	100 to 120 V ± 10%
Power Line Frequency:	50/60 Hz
Power Consumption:	700 VA

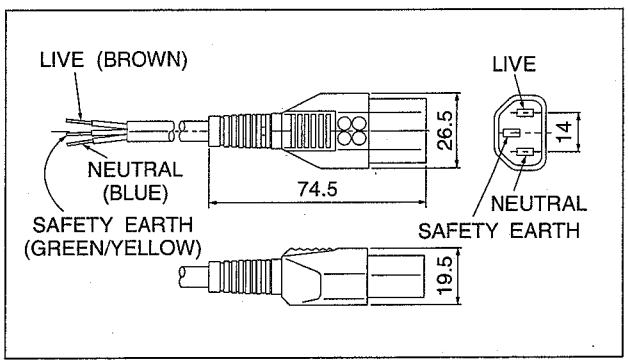
Note: When the unit is first powered ON, a maximum surge current of 20A will flow. The AC supply must therefore be capable of supplying this surge current, otherwise the power supply breaker on the supply side of the AC power supply may trip, or the unit may fail to function normally.

1-3-2. Power Cable Coding

Approx. 2.4m in length
For DVR-20



For DVR-20P



1-3-3. Ventilation/Heat Sink

Two cooling fans are fitted. If either the intake or exhaust becomes clogged or the fans stop, damage may result to the power unit etc.
The heat sinks provided on each board are rated on the assumption that cooling will be provided by the fans. Consequently, the unit should not be operated too long without fan cooling (such as when the unit is opened for checks etc.).

1-4. INSTALLATION CONDITIONS

Operating Temperature:	+5°C to +40°C
Storage Temperature:	–20°C to +60°C
Humidity:	10% to 80 % (no condensation)

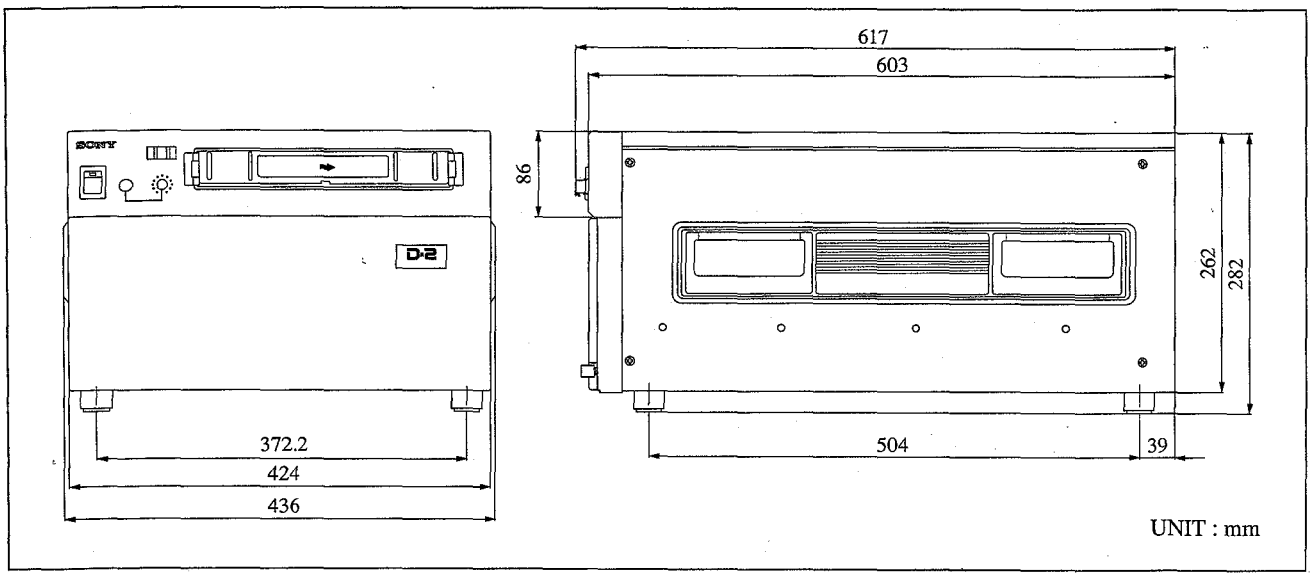
Install DVR-20/20P on a flat stable base horizontally, or in the specified position.

The weight of DVR-20/20P is about 50 kg after the blank panel has been removed and the function control panel (BKDV-201, BKDV-200 or BKDV-101) installed.

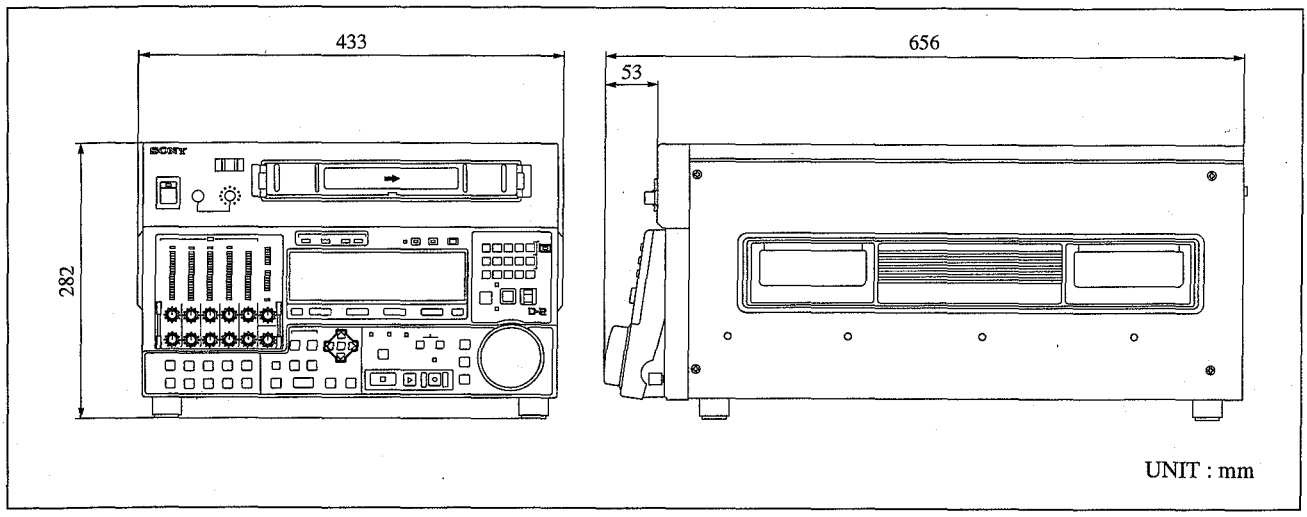
Do not install the unit in the following locations:
* Exposed to direct sunlight or powerful lighting
* In a dusty location
* In a location which is subjected to vibration
* In a powerful electric or magnetic field
* In a location which is subjected to static electricity noise

1-5. INSTALLATION SPACE

(1) External Dimensions



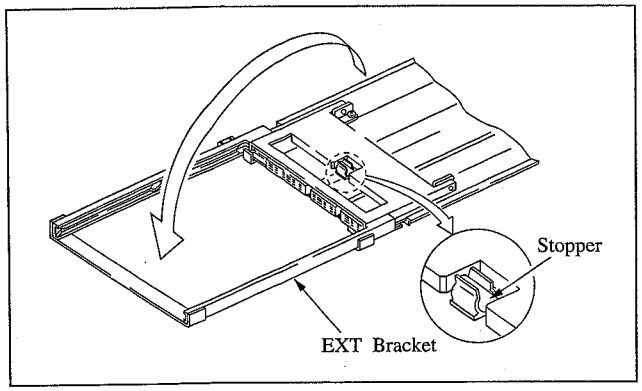
(2) When installing the function control panel
For BKDV-201/200/101
(This illustration is BKDV-201.)



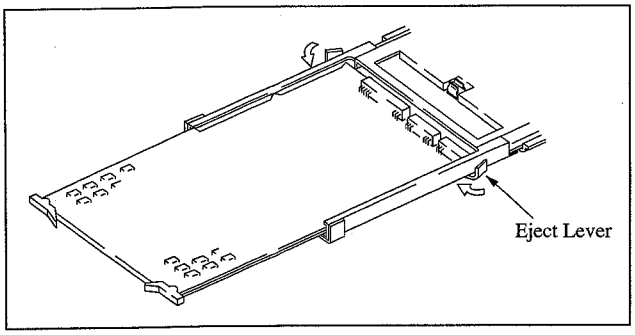
1-6. USING THE EXTENSION BOARD, EX-341

When the extension board EX-341 is used, install as follows:

(1) Open the EXT Bracket in the direction of the arrow so that the stopper is inserted and fixed into the holder as shown in the figure.



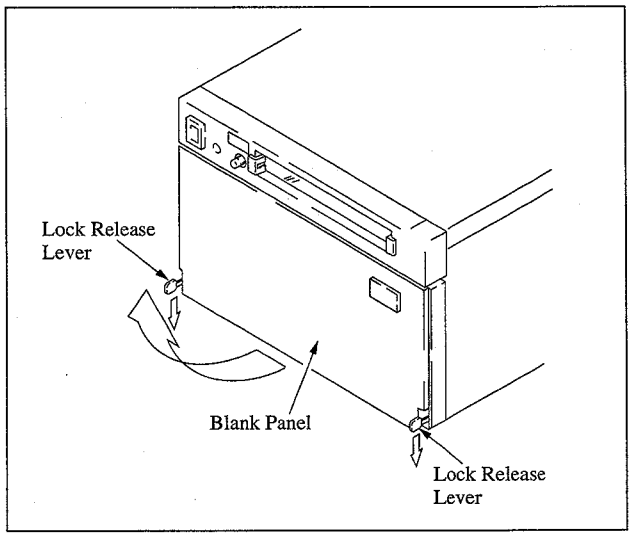
(2) When removing the mounted circuit board from the extension board, pull the eject levers in the direction of the arrows.



1-7. INSTALLING THE FUNCTION CONTROL PANEL

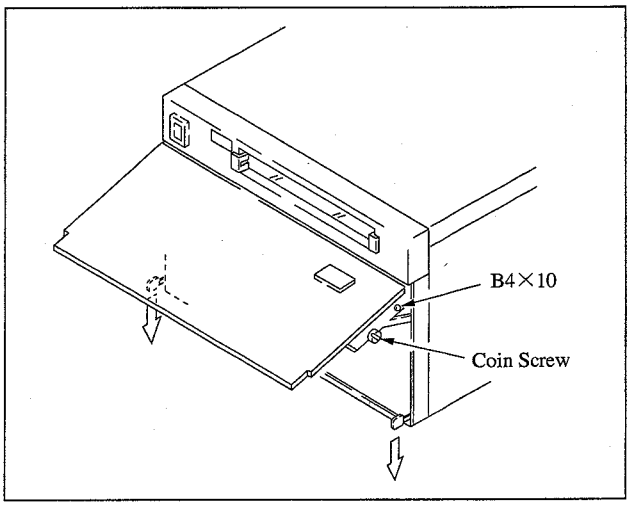
1-7-1. Blank Panel Removal

(1) Push down the lock release levers, and open the blank panel to lock the blank panel.



(2) Loosen the coin screws (one on each side) fully, and loosen the two screws (B4x10) two turns.

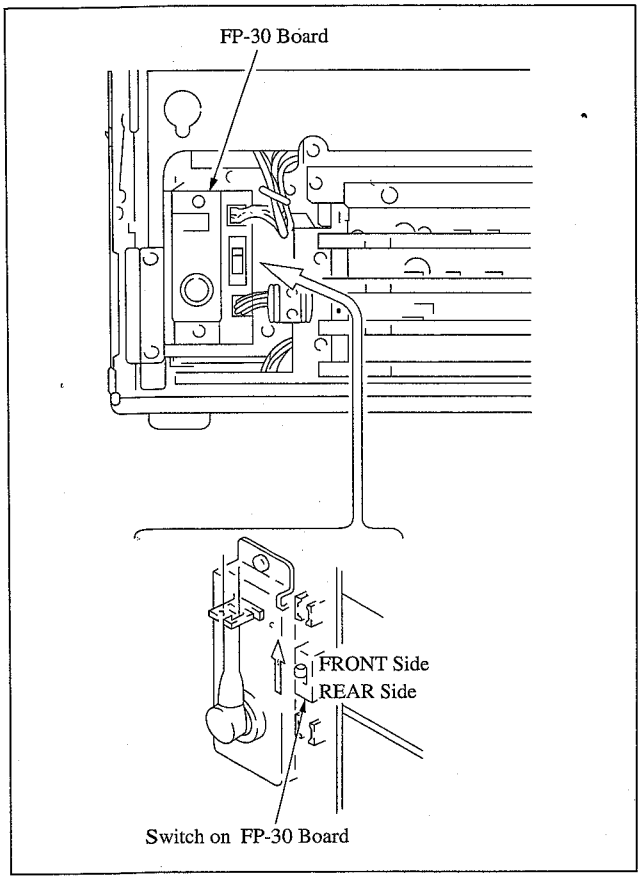
(3) Lift the blank panel toward the front and remove it in the direction of the arrow.



1-7-2. Installing the Function Control Panel

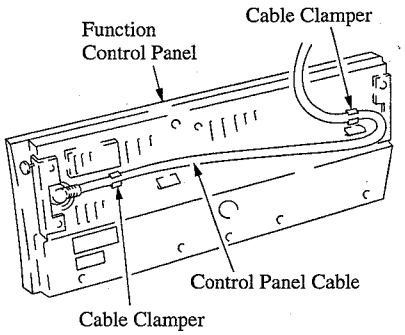
When installing the control panel on the unit

(1) Check that the switch on FP-30 board located at the front of the VTR, is set to FRONT side.

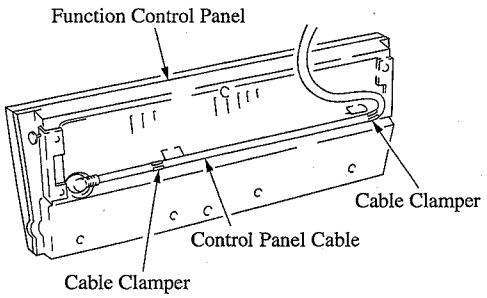


(2) Connect the control panel cable provided with the unit to the function control panel, and fix the control panel cable using the cable clamper to prevent the cable from becoming slack.

BKDV-101



BKDV-200/201



1-8. INPUT/OUTPUT INTERFACE

1-8-1. Matching Connectors and Cables

DVR-20 Connector		Matching Connectors/Cables	
Used for	**Type**	**Connectors**	**Sony Part No.**
DIGITAL VIDEO INPUT (PARALLEL) DIGITAL VIDEO OUTPUT (PARALLEL)	D-sub, 25pin, Female	D-sub, 25pin, Male VCD-2D/5D/10D/ 30D CABLE	1-566-356-11 Optional Accessory **(Note 1)**
ANALOG VIDEO INPUT VIDEO (LOOP-THROUGH) ANALOG VIDEO INPUT REF (LOOP-THROUGH) ANALOG VIDEO INPUT CF PULSE	BNC	BNC	
ANALOG VIDEO OUTPUT VIDEO-1, 2, 3 ANALOG VIDEO OUTPUT CF PULSE ANALOG VIDEO OUTPUT MONITOR ANALOG VIDEO OUTPUT WFM ANALOG VIDEO OUTPUT CHARACTER	BNC	BNC	
DIGITAL SERIAL V/A INPUT DIGITAL SERIAL V/A THROUGHOUT DIGITAL SERIAL V/A SERIAL OUT-1, 2, 3	BNC	BNC	
DIGITAL AUDIO INPUT CH-1/2 DIGITAL AUDIO INPUT CH-3/4 DIGITAL AUDIO OUTPUT CH-1/2 DIGITAL AUDIO OUTPUT CH-3/4	XLR 3pin, Female XLR 3pin, Female XLR 3pin, Male XLR 3pin, Male	ECD-3C/10C/30C CABLE	Optional Accessory **(Note 2)**
ANALOG AUDIO INPUT CH-1, 2, 3, 4 ANALOG AUDIO OUTPUT CH-1, 2, 3, 4 ANALOG AUDIO CUE INPUT ANALOG AUDIO CUE OUTPUT	XLR 3pin, Female XLR 3pin, Male XLR 3pin, Female XLR 3pin, Male	XLR 3pin, Male XLR 3pin, Female XLR 3pin, Male XLR 3pin, Female	1-508-084-11 **(Note 4)** 1-508-083-11 **(Note 3)** 1-508-084-11 **(Note 4)** 1-508-083-11 **(Note 3)**
ANALOG TIME CODE INPUT ANALOG TIME CODE OUTPUT	XLR 3pin, Female XLR 3pin, Male	XLR 3pin, Male XLR 3pin, Female	1-508-084-11 **(Note 4)** 1-508-083-11 **(Note 3)**
ANALOG MONITOR L ANALOG MONITOR R	XLR 3pin, Male XLR 3pin, Male	XLR 3pin, Female XLR 3pin, Female	1-508-083-11 **(Note 3)** 1-508-083-11 **(Note 3)**
RS-422 REMOTE-IN RS-422 REMOTE-OUT RS-422REMOTE-IN/OUT	D-sub, 9pin, Female	D-sub, 9pin, Male RCC-5G/10G/30G CABLE	1-509-140-00 Optional Accessory **(Note 5)**
RS-232C PARALLEL I/O V/A CONTROL REMOTE-IN GP-IB CONTROL PANEL	D-sub, 25pin, Female D-sub, 50pin, Female D-sub, 15pin, Female D-sub, 15pin, Female GP-IB MULTI, 8pin	D-sub, 25pin, Male D-sub, 50pin, Male D-sub, 15pin, Male D-sub, 15pin, Male GP-IB(IEEE-488) CONTROL PANEL CABLE	1-566-356-11 1-566-358-11 1-566-355-11 1-566-355-11 **(Note 6)**
HEADPHONES	6ø Phone Jack	6ø Phone Jack	

(Note 1) Digital video input/output cables. The length of the cables are 2 m, 5 m, 10 m and 30 m.
(Note 2) Digital audio input/output cables. The length of the cables are 3 m, 10 m, and 30 m.
(Note 3) Equivalent to CANNON XLR-3-11C.
(Note 4) Equivalent to CANNON XLR-3-12C.
(Note 5) The length of the cables are 5 m, 10 m and 30 m.
(Note 6) The length of the cables are 0.8 m (1-559-692-11) and 10 m (1-559-936-11). One cable (10 m) is supplied with DVR-20/20P.

1-8-2. Signal Inputs and Outputs

(1) VIDEO

DVR-20

Connector	Specifications
VIDEO INPUT	
Analog	1.0 V±0.3 Vp-p, 75 Ω
Digital	Parallel interface: SMPTE T14.224/082A format Serial V/A interface: 0.8 Vp-p, 75 Ω, SMPTE T14.224×2131D
Reference	Composite signal (black burst) Sync & burst: 0.3 Vp-p, 75 Ω
VIDEO OUTPUT	
Analog	ANALOG VIDEO-1/2 OUTPUT: 1.0 Vp-p, 75 Ω ANALOG VIDEO-3 OUTPUT: 1.0 Vp-p, 75 Ω Composite/non-composite switchable CHARACTER OUTPUT: 1 Vp-p, 75 Ω MONITOR OUTPUT: 1 Vp-p, 75 Ω
Digital	Parallel interface: SMPTE T14.224/082A format Serial V/A interface: 0.8 Vp-p, 75 Ω, SMPTE T140.224×2131D

DVR-20P

Connector	Specifications
VIDEO INPUT	
Analog	1.0 V±0.3 Vp-p, 75 Ω
Digital	Parallel interface: ECL balanced Serial V/A interface: 0.8 Vp-p, 75 Ω
Reference	Composite signal (black burst) Sync & burst: 0.3 Vp-p, 75 Ω
VIDEO OUTPUT	
Analog	ANALOG VIDEO-1/2 OUTPUT: 1.0 Vp-p, 75 Ω ANALOG VIDEO-3 OUTPUT: 1.0 Vp-p, 75 Ω Composite/non-composite switchable CHARACTER OUTPUT: 1 Vp-p, 75 Ω MONITOR OUTPUT: 1 Vp-p, 75 Ω
Digital	Parallel interface: ECL balanced Serial V/A interface: 0.8 Vp-p, 75 Ω

(2) AUDIO

DVR-20

Connector	Specifications
AUDIO INPUT	
Analog	CH1, CH2, CH3, CH4: +28 dBm max. (+8 dBm normal), 150 Ω/600 Ω/HIGH impedance (switchable)
Digital	CH1, CH2, CH3, CH4: AES/EBU format Serial V/A: 0.8 Vp-p, 75 Ω, SMPTE T14.224×2131D (Video & Audio)
Cue channel	LINE input: +18 dBm max. (+8 dBm normal), 150 Ω/600 Ω/HIGH impedance (switchable) MIC input: –44 dBm max. (–60 dBm normal), high impedance
AUDIO OUTPUT	
Analog	CH1, CH2, CH3, CH4: +28 dBm max. (+8 dBm normal)
Digital	CH1, CH2, CH3, CH4: AES/EBU format Serial V/A: 0.8 Vp-p, 75 Ω, SMPTE T14.224×2131D (Video & Audio)
Cue channel	CUE: +18 dBm max.(+8 dBm normal), low impedance
Monitor output	MONITOR L/R: +28 dBm max. (+8 dBm normal), low impedance
Headphones output level	Variable (adjustable with VR control)

DVR-20P

Connector	Specifications
AUDIO INPUT	
Analog	CH1, CH2, CH3, CH4: +28 dBm max. (+8 dBm normal), 150 Ω/600 Ω/HIGH impedance (switchable)
Digital	CH1, CH2, CH3, CH4: AES/EBU format Serial V/A: 0.8 Vp-p, 75 Ω
Cue channel	LINE input: +18 dBm max. (+8 dBm normal), 150 Ω/600 Ω/HIGH impedance (switchable) MIC input: –44 dBm max. (–60 dBm normal), high impedance
AUDIO OUTPUT	
Analog	CH1, CH2, CH3, CH4: +28 dBm max. (+8 dBm normal)
Digital	CH1, CH2, CH3, CH4: AES/EBU format Serial V/A: 0.8 Vp-p, 75 Ω
Cue channel	CUE: +18 dBm max.(+8 dBm normal), low impedance
Monitor output	MONITOR L/R: +28 dBm max. (+8 dBm normal), low impedance
Headphones output level	Variable (adjustable with VR control)

(3) OTHERS

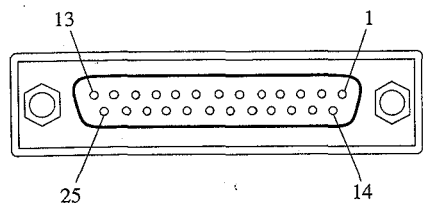
Connector	Specifications
CF PULSE IN/OUT	TTL level
WFM OUT	1.0 Vp-p, 75 Ω Video/CTL/RF envelope (A/C, B/D, all channels) selectable

(4) TIME CODE

Connector	Specifications
TIME CODE INPUT	2.4 V±1.4 Vp-p, 10 kΩ
TIME CODE OUTPUT	2.4 Vp-p, low impedance

(5) DIGITAL VIDEO INPUT Connector

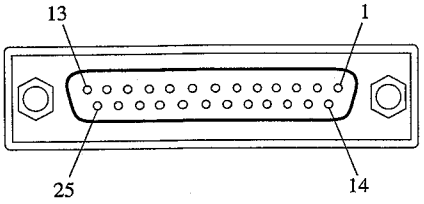
- Outside View -



Pin No.	Signal	Spec.
1	CLOCK	ECL
2	SYSTEM GROUND	
3	DATA 7 (MSB)	ECL
4	DATA 6	ECL
5	DATA 5	ECL
6	DATA 4	ECL
7	DATA 3	ECL
8	DATA 2	ECL
9	DATA 1	ECL
10	DATA 0	ECL
11	DATA A	ECL
12	DATA B	ECL
13	CHASSIS GROUND	
14	CLOCK RET.	ECL
15	SYSTEM GROUND	
16	DATA 7 RET.	ECL
17	DATA 6 RET.	ECL
18	DATA 5 RET.	ECL
19	DATA 4 RET.	ECL
20	DATA 3 RET.	ECL
21	DATA 2 RET.	ECL
22	DATA 1 RET.	ECL
23	DATA 0 RET.	ECL
24	DATA A RET.	ECL
25	DATA B RET.	ECL

(6) DIGITAL VIDEO OUTPUT Connector

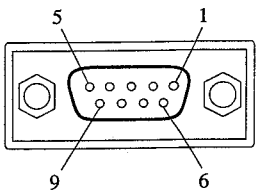
- Outside View -



Pin No.	Signal	Spec.
1	CLOCK	ECL
2	SYSTEM GROUND	
3	DATA 7 (MSB)	ECL
4	DATA 6	ECL
5	DATA 5	ECL
6	DATA 4	ECL
7	DATA 3	ECL
8	DATA 2	ECL
9	DATA 1	ECL
10	DATA 0	ECL
11	DATA A	ECL
12	DATA B	ECL
13	CHASSIS GROUND	
14	CLOCK RET.	ECL
15	SYSTEM GROUND	
16	DATA 7 RET.	ECL
17	DATA 6 RET.	ECL
18	DATA 5 RET.	ECL
19	DATA 4 RET.	ECL
20	DATA 3 RET.	ECL
21	DATA 2 RET.	ECL
22	DATA 1 RET.	ECL
23	DATA 0 RET.	ECL
24	DATA A RET.	ECL
25	DATA B RET.	ECL

(7) RS-422 REMOTE IN Connector

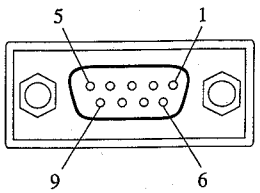
- Outside View -



Pin No.	Signal	Spec.	Description
1	FRAME GND		
2	REM-A IN -	0 to +5V	CMD LINE (-)
3	REM-A OUT +	0 to +5V	STATUS LINE (+)
4	GND		
5	NC		
6	GND		
7	REM-A IN +	0 to +5V	CMD LINE (+)
8	REM-A OUT -	0 to +5V	STATUS LINE (-)
9	FRAME GND		

(8) RS-422 REMOTE OUT Connector

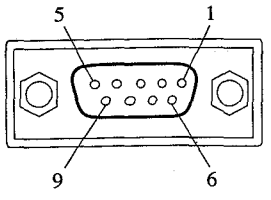
- Outside View -



Pin No.	Signal	Spec.	Description
1	FRAME GND		
2	REM-B IN -	0 to +5V	CMD LINE (-)
3	REM-B OUT +	0 to +5V	STATUS LINE (+)
4	GND		
5	NC		
6	GND		
7	REM-B IN +	0 to +5V	CMD LINE (+)
8	REM-B OUT -	0 to +5V	STATUS LINE (-)
9	FRAME GND		

(9) RS-422 REMOTE IN/OUT Connector

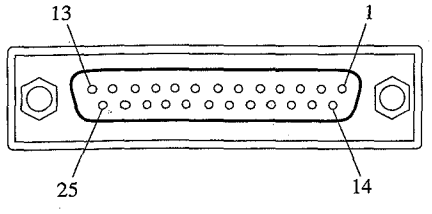
- Outside View -



Pin No.	Signal	Spec.	Description
1	FRAME GND		
2	REM-C IN -	0 to +5V	CMD LINE (-)
3	REM-C OUT +	0 to +5V	STATUS LINE (+)
4	GND		
5	NC		
6	GND		
7	REM-C IN +	0 to +5V	CMD LINE (+)
8	REM-C OUT -	0 to +5V	STATUS LINE (-)
9	FRAME GND		

(10) RS-232C Connector

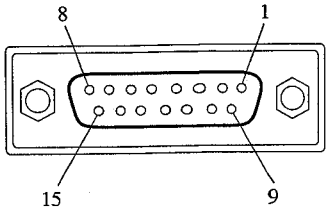
- Outside View -



Pin No.	Signal	Spec.	Description
1	FRAME GND		
2	TX	-25 to +25V, MAX	TRANSMIT
3	RX	-25 to +25V, MAX	RECEIVE
4	RTS	-25 to +25V, MAX	REQUEST TO SEND
5	CTS	-25 to +25V, MAX	CLEAR TO SEND
6	DSR	-25 to +25V, MAX	DATA SET READY
7	GND		SIGNAL GROUND
8	DCR	-25 to +25V, MAX	CARRIER DETECT
9	NC		
10	NC		
11	NC		
12	NC		
13	NC		
14	NC		
15	NC		
16	NC		
17	NC		
18	NC		
19	NC		
20	DTR	-25 to +25V, MAX	DATA TERMINAL READY
21	NC		
22	NC		
23	NC		
24	NC		
25	NC		

(14) REMOTE IN

- Outside View -



Pin No.	Signal	Spec.	Description
1	N.C		
2	RX (–)	0 to +5V	RECEIVE DATA (–)*
3	TX (–)	0 to +5V	TRANSMIT DATA (–)*
4	N.C		
5	N.C		
6	N.C		
7	N.C		
8	SPARE		
9	GND		
10	RX (+)	0 to +5V	RECEIVE DATA (+)*
11	TX (+)	0 to +5V	TRANSMIT DATA (+)*
12	+12V		POWER SUPPLY
13	FRAME GND		GND
14	GND		
15	N.C		

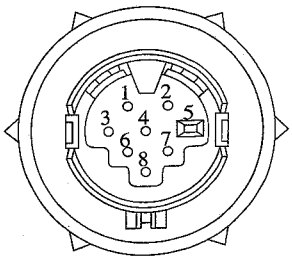
* Asynchronous, bit serial signal

• Based on the EIA RS-422-A

• Full duplex communication channels

(15) CONTROL PANEL Connector

- Outside View -

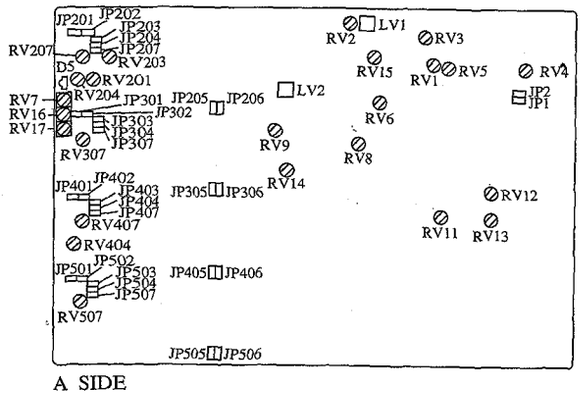


Pin No.	Signal	Spec.	Description
1	NC		
2	RS Bch C (-)	0 to +5V	COMMAND LINE (-)
3	RS Bch S (+)	0 to +5V	STATUS LINE (+)
4	GND		
5	+22V		POWER +22 V UNREGURATED DC
6	GND		
7	RS Bch C(+)	0 to +5V	COMMAND LINE (+)
8	RS Bch S (-)	0 to +5V	STATUS LINE (-)

1-9. SWITCH/JUMPER/INDICATOR/ADJUSTMENT SETTINGS

The factory setting can be changed according to the operating conditions as follows:

AD-73/P BOARD



A SIDE

Indicator

D5 (C1): ANALOG IN indicator (green)
This indicator lights when the ANALOG VIDEO signal is present.

Jumpers

(1) JP1, JP2 (C21): INTERNAL alignment
JP1: NORMAL
JP2: INTERNAL
When shipped, set to JP1. When adjusting RV9, set to JP2.

(2) Analog Audio Reference Level Setting
The reference levels are set to +8 dBm when shipped.

Reference Level	CH-1	CH-2	CH-3	CH-4
0 to +4 dBm	JP204/SHORT	JP304/SHORT	JP404/SHORT	JP504/SHORT
+8 dBm	JP203/SHORT	JP303/SHORT	JP403/SHORT	JP503/SHORT
-20 dBm	JP207/SHORT	JP307/SHORT	JP407/SHORT	JP507/SHORT

(3) Audio Input Impedance Setting
The input impedance can be changed according to the setting of the JP (jumper pins) as follows.
When shipped, set to 600 ohm.

	CH-1	CH-2	CH-3	CH-4
600 ohm	JP201/SHORT	JP301/SHORT	JP401/SHORT	JP501/SHORT
150 ohm	JP202/SHORT	JP302/SHORT	JP402/SHORT	JP502/SHORT
High Impedance	JP201,JP202 OPEN	JP301,JP302 OPEN	JP401,JP402 OPEN	JP501,JP502 OPEN

(4) Dither ON/OFF Setting
When shipped, set to the OFF position.
Usually set to the OFF position.

DITHER	CH-1	CH-2	CH-3	CH-4
OFF	JP205/SHORT	JP305/SHORT	JP405/SHORT	JP505/SHORT
ON	JP206/SHORT	JP306/SHORT	JP406/SHORT	JP506/SHORT

Adjustments

RV1 (B16) : AD alignment
This adjustment is used for AD converter matching adjustment.
RV2 (A13) : Not used.
RV3 (A16) : AD Reference alignment
This adjustment is used for AD converter reference voltage.
RV4 (C21) : Offset alignment
This adjustment is used for pedestal level adjustment.
RV5 (B17) : HUE alignment
This adjustment is used for 4fsc phase adjustment.
RV6 (C14) : Video Gain alignment
RV7 (C1) : Video Gain fine-alignment
RV8 (E13) : Internal SC Frequency alignment
RV9 (D8) : Internal SC phase alignment
RV11 (G17) : Color Framing alignment
RV12 (F19) : Color Framing Detection Circuit Gain alignment
RV13 (G19) : Color Framing Detection Circuit Offset alignment
RV14 (F9) : Input SC-H alignment
This adjustment is used for SC-H adjustment when INPUT reference selected.

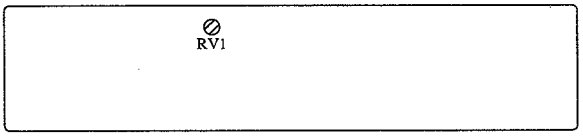
LV1 (C1) : CUE REC Bias Current Resonance alignment
LV2 (G1) : CTL REC Bias Current Resonance alignment-2
LV3 (F4) : TC REC Bias Current Resonance alignment
LV4 (K4) : CUE Channel Erase Current Resonance alignment
LV5 (L4) : TC Channel Erase Current Resonance alignment
LV6 (M5) : CTL Channel Erase & Full Erase Current alignment
LV7 (F2) : CTL REC Bias Current Resonance alignment-1
LV8 (E3) : TC REC Bias Current Resonance alignment-1

Switches

SW1 (L4) : Capacitor Change switch for CTL Channel Erase & Full Erase Current Resonance alignment
This switch can change by 100 PF from 1000 PF to 1500 PF.
When shipped, this switch is set to the suitable position.

SW2 (K4) : Capacitor Change switch for TC Channel Erase Current Resonance alignment
SW3 (K4) : Capacitor Change switch for CUE Channel Erase Resonance alignment
Only channel-2 can be used at 900 PF or 1000 PF.
When shipped, these switches are set to the suitable position.

CT-133 Board

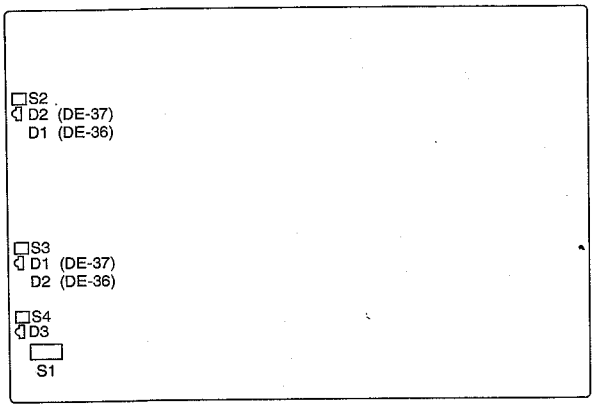


A SIDE

Adjustment

RV1 (B1) : +22V Output Voltage alignment

DE-37/DE-36 Board



A SIDE

Indicators

D1 (A17/A7) : Video Outer Correction Off indicator (red)
This indicator lights when the Video Outer Correction ON/OFF switch (S3) in the front of DE-37/36 board is set to the OFF position.

D2 (A7/A17) : Inner Correction Off indicator (red)
This indicator lights when the Inner Correction ON/OFF switch (S2) in the front of DE-37/36 board is set to the OFF position.

D3 (A21) : Audio Outer Correction OFF indicator (red)
This indicator lights when the Audio Outer Correction OFF switch (S4) in the front of DE-37/36 board is set to the OFF position.

Switches

S1-1 (A23) : Jog Audio Sel switch
When JOG and VAR playback, select PB digital audio by whether repeated sound or interpolation sound. When this switch is set to the ON position, the repeated sound can be selected. When this switch is set to the OFF position, the interpolation sound can be selected.
Usually set to the OFF position. When shipped, set to the OFF position.

S1-2 (A23) : Freeze Sel (Shuttle) switch
When the PB signal is no signal in the shuttle play mode, this switch selects whether the frozen picture is output or not.
When this switch is set to the ON position, the frozen picture is output. When this switch is set to the OFF position, the PB signal is output.

S1-3 (A23) : Freeze Sel (Normal) switch
When the PB signal is no signal in the normal play mode, this switch selects whether the frozen picture is output or not.
When this switch is set to the ON position, the PB signal is output. When this switch is set to the OFF position, the frozen picture is output.

S1-4 (A23) : Det Mode switch
Set to the OFF position.

S1-5 (A23), S1-6 (A23) : Not used.

S1-7 (A23) : AC CH RF switch
S1-8 (A23) : BD CH RF switch
This switch selects whether RF data of AC CH or BD CH is used or not. Usually set to the OFF position. When shipped, set to the OFF position.

S2 (A6) : Inner Correction ON/OFF switch
Set to the ON position. When this switch is set to the OFF position, errors are not corrected at the Inner Decoder. In this condition, the Inner Correction OFF indicator (D2) on DE-37/36 board lights.

S3 (A16) : Video Outer Correction ON/OFF switch
Set to the ON position. When this switch is set to the OFF position, errors are not corrected at the Video Outer Decoder. In this condition, the Video Outer Correction OFF indicator (D1) on DE-37/36 board lights.

S4 (A21/A20) : Audio Outer Correction ON/OFF switch
Set to the ON position. When this switch is set to the OFF position, errors are not corrected at the Audio Outer Decoder. In this condition, the Audio Outer Correction OFF indicator (D3) on DE-37/36 board lights.

Jumpers

JW1 to JW7, X5:
For DVR-20
JW1 (G16), JW3 (G16), JW5 (H23) and JW6 (M22) are shorted.
JW2 (G16), JW4 (G16), JW7 (M22) and X5 (J22) are opened.
For DVR-20P
JW1, JW3, JW5 and JW6 are opened.
JW2, JW4, JW7 and X5 are shorted.

Switches

S2 (F10) : 8P Dip switch
Bit1 : ON → Character Blink Enable
OFF → Character Blink Disable
Bit2 : Reserve
Bit3 : Reserve
Bit4 : Reserve
Bit5 : Reserve
Bit6 : Reserve
Bit7 : ON → JOG/VAR/SHUTTLE Audio -6 dB Out
OFF → SHUTTLE -6 dB Out
Bit8 : Reserve
When shipped, set to the ON position except for Bit7.

S3 (N13) :
This switch detects zero position in digital audio recording.
*zero position = audio recorded position against video frame
When shipped, set as follows:

	Bit1	Bit2	Bit3	Bit4	Bit5	Bit6	Bit7	Bit8	Bit9	Bit10
NTSC	OFF	OFF	OFF	OFF	ON	ON	OFF	ON	OFF	ON
PAL	OFF	OFF	ON	ON	OFF	OFF	ON	OFF	ON	ON

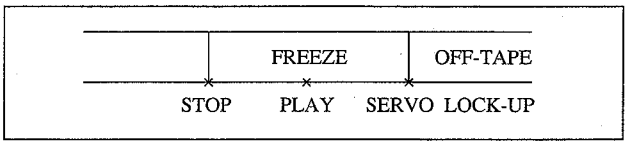
S4 (A23) : 8P Dip switch
S4-1, S4-2 : (Factory Use)
Set to the ON position.
S4-3, S4-4 : RF Test switch
The digital video value is output to the RF boards when the switches are set in combination below.
When shipped, set to the ON position.

Digital Video Value	S4-3	S4-4
(FF)H	OFF	ON
(AA)H	ON	OFF
(BD)H	OFF	OFF

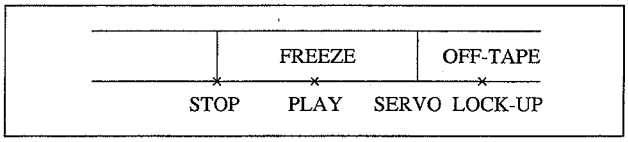
S4-5, S4-6 : Stop Picture Mode Select switch
These switches can be set in combination below.

	S4-5	S4-6
SETTING 1	ON	ON
SETTING 2	ON	OFF
SETTING 3	OFF	OFF

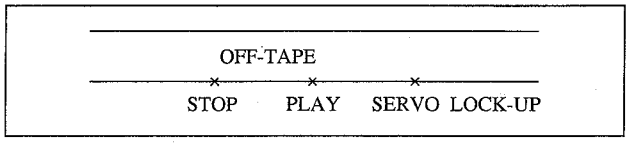
SETTING 1
This setting is used as a factory set-up.
The unit freezes a noise-free picture just before the tape stops and keep displaying it until the next servo lock up.



SETTING 2
The unit freezes a picture, like the factory setting, but continues to renew the picture with OFF-TAPE video as in shuttle mode. The output is free from the picture jumps which occur with the factory setting.



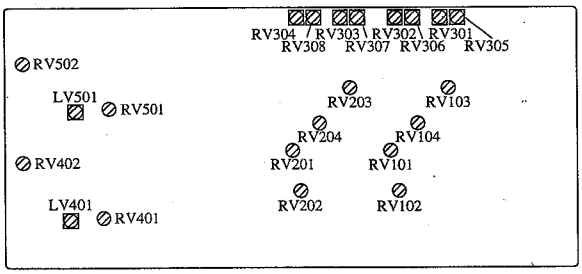
SETTING 3
The OFF TAPE video can be displayed on the monitor.



S4-7, S4-8 : (Factory Use)
Set to the ON position.

S5 (A26) : CPU Reset switch
When this switch is pressed, the CPU on EN-99 board is reset.

EQ-29 Board



A SIDE

Adjustments

Note: Do not turn the following adjustments except when adjusting.
For details, refer to Section 13 "RF Signal System Alignment."

RV101 (D2), RV201 (C2) : (Factory Use)

RV102 (D2) : A/C-CH RF Envelope Offset alignment
RV202 (C2) : B/D-CH RF Envelope Offset alignment
These adjustments are used for the offset alignment of envelope detection board, RE-41.

RV103 (D1) : A/C-CH RF Switching Offset alignment
RV203 (C1) : B/D-CH RF Switching Offset alignment
These adjustments are used for A/C or B/D level alignment of RF switching.

RV104 (D2), RV204 (C2) : (Factory Use)

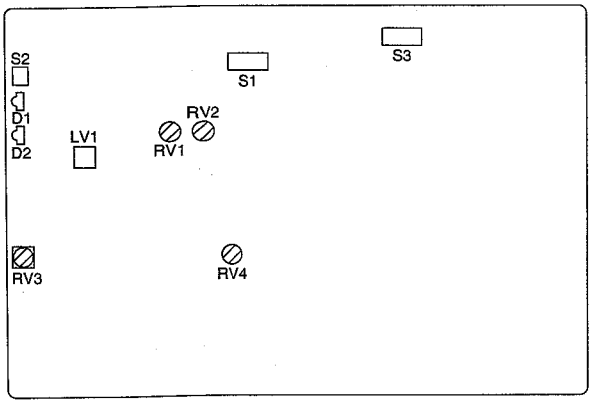
RV301 (D1) : PB EQ A-CH adjustment
RV302 (D1) : PB EQ C-CH adjustment
RV303 (C1) : PB EQ B-CH adjustment
RV304 (C1) : PB EQ D-CH adjustment
RV305 (D1) : PB Phase A-CH adjustment
RV306 (D1) : PB Phase C-CH adjustment
RV307 (C1) : PB Phase B-CH adjustment
RV308 (C1) : PB Phase D-CH adjustment
These adjustments are used for the video PB equalizer adjustment.

RV401 (A3) : PLL A/C Offset alignment
RV501 (A2) : PLL B/D Offset alignment
These adjustments are used for the offset alignment of A/C or B/D channel PLL control signal.

RV402 (A2) : PLL A/C Balance alignment
RV502 (A1) : PLL B/D Balance alignment
These adjustments are used for the free run frequency alignment when no VCO signal of A/C or B/D channel is input.

LV401 (A3) : PLL A/C Frequency alignment
LV501 (A2) : PLL B/D Frequency alignment
These adjustments are used for VCO V-frequency characteristic alignment of A/C or B/D channel.

PR-163 Board



A SIDE

Indicators

D1 (A7) : Conceal OFF indicator (red)
This indicator lights when the Video Conceal ON/OFF switch in front of PR-163 board is set to the OFF position.

D2 (A9) : NO EXT REF indicator (red)
This indicator lights when the REF Video signal is absent.

Adjustments

RV1 (A19) : CF Gain alignment
RV2 (A19) : CF Offset alignment
RV3 (A21) : CF Control alignment
RV4 (D21) : SC Phase alignment

LV1 (B3) : Burst alignment

Switches

S1-1 to S1-3 (J5) :
These switches are used to select a signal from the video output terminals in the absence of other signal. The factory setting is GRAY LEVEL.

NOTE: Do not set the switches in any combination except for the following settings.

Output Signal	S1-1	S1-2	S1-3
Black Level	ON	OFF	OFF
Gray Level	OFF	ON	OFF
Noise Pattern	OFF	OFF	ON

S1-4 to S1-6 (J5) : (Factory Use)
Set to the OFF position.

S1-7 (J5) :

Y/C Separate Mode	S1-7
Band Pass Mode	ON
Adaptive Y/C Separate Mode	OFF

(Factory Setting is the OFF position.)

S1-8, S1-9 (J5): (Foctory Use)
Set to the OFF position.

S1-10 (H4): Field Concealment Inhibit Switch
Factory setting is the OFF position,
When set to the ON position, this switch inhibits to be preformed field concealment.

S2 (A6) : Video Conceal ON/OFF switch
Set to the ON position. When this switch is set to the OFF position, the video signal error is not concealed. In this condition, the Conceal Off indicator (D1) on PR-163 board lights.

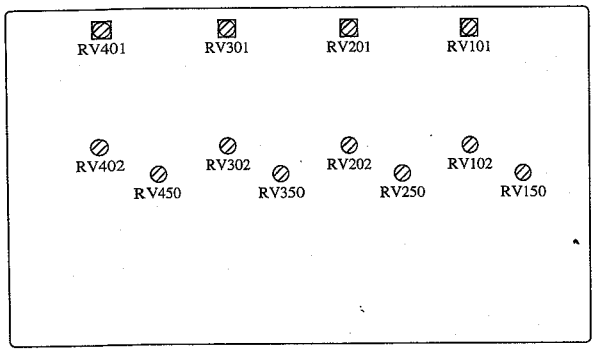
S3-1 to S3-5 (Q2) : (Factory Use)
Set to the OFF position except S3-3. (S3-3 is set to the ON position.)

S3-6 : Bar Graph ON/OFF switch when Multi Loop Test
ON: There is no Bar Graph.
OFF: There is Bar Graph.
When shipped, set to the OFF position.

S3-7 : Multi Loop Test External Delay Mode switch
ON: External Delay 2 Line
OFF: except External Delay 2 Line
When shipped, set to the OFF position.

S3-8 : (Factory Use)
Set to the OFF position.

REC-11 Board

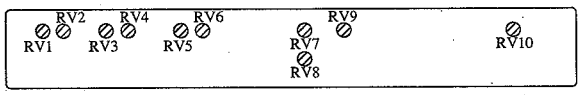


A SIDE

Adjustments

RV101 (E1) : CH-A REC Current Frequency Characteristic alignment
RV201 (D1) : CH-C REC Current Frequency Characteristic alignment
RV301 (C1) : CH-B REC Current Frequency Characteristic alignment
RV401 (B1) : CH-D REC Current Frequency Characteristic alignment
RV102 (E2) : CH-A REC Current Secondary Distortion alignment
RV202 (D2) : CH-C REC Current Secondary Distortion alignment
RV302 (C2) : CH-B REC Current Secondary Distortion alignment
RV402 (B2) : CH-D REC Current Secondary Distortion alignment
RV150 (E3) : CH-A REC Head PB Envelope Gain alignment
RV250 (D3) : CH-C REC Head PB Envelope Gain alignment
RV350 (C3) : CH-B REC Head PB Envelope Gain alignment
RV450 (B3) : CH-D REC Head PB Envelope Gain alignment

RE-42 Board



COMPONENT SIDE

Adjustments

RV1 (L1), RV3 (J1), RV5 (H1)
: Series Regulator Voltage alignment
RV2 (K1) : Series Regulator Current Limiter alignment (+12V)
RV4 (J1) : Series Regulator Current Limiter alignment (-12V)
RV6 (H1) : Series Regulator Current Limiter alignment (-5V)
RV7 (F1), RV8 (E1), RV9 (E1)
: +5V Voltage alignment (+14V)
RV10 (A1) : Motor System Output Voltage alignment (+14V)

1-10. RACK-MOUNTING

The unit can be mounted in a 19-inch standard rack.
In this case, use rack mount rail, RMM-18DV, optional accessory.

NOTE when mounting:

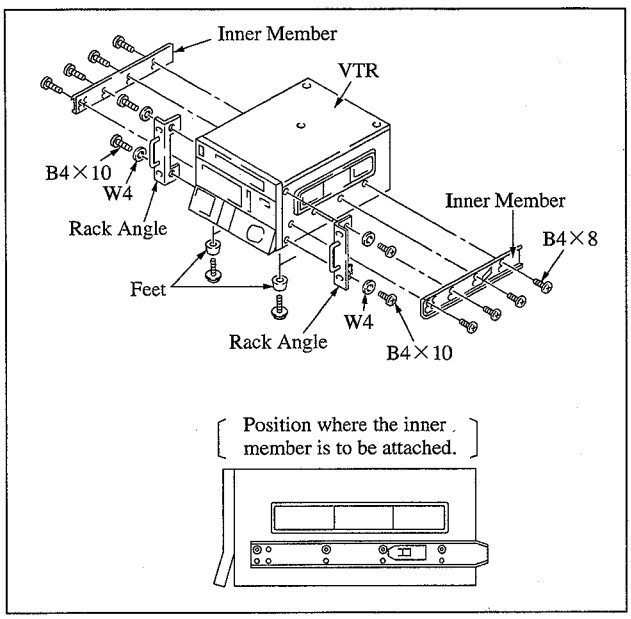
(1) When several units are mounted in a rack, it is recommended that a fan is installed for ventilation. Good air circulation is essential to prevent internal heat built-up in a rack (5 °C to 40°C must be met for all units.)

(2) Do not remove the top panels and the bottom panel during rack mounting.

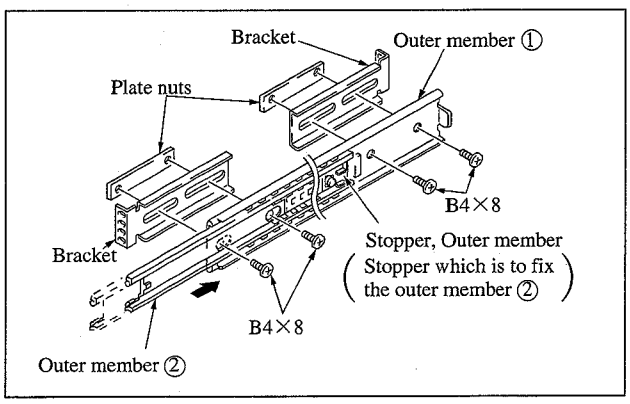
(3) Be sure to secure the rack to the floor to avoid accidents when the unit is pulled out.

Attaching:

(1) Attach the rack angles and inner members.
Attach the rack angles using the four screws (B4x10) and the four washers (W4) which secured the panels.
Remove the feet from the unit if necessary.

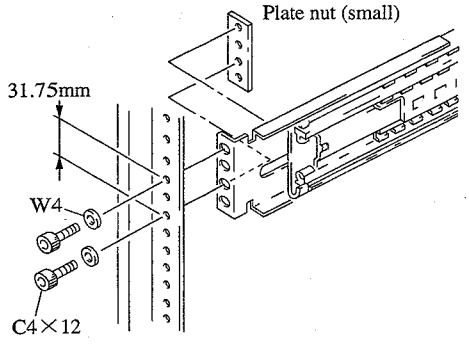


(2) Slide the outer member ② so that the screw holes can be seen.
Mount the bracket to the outer member ① temporarily with screws (B4x8) and plate nuts (long).

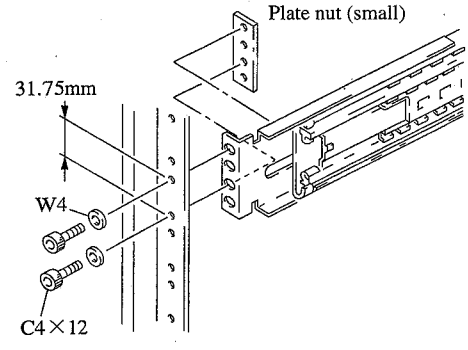


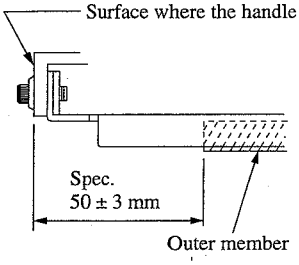
(3) Mount the outer member ass'y to the rack temporarily with screws (C4x12), washers (W4), and plate nuts (small).
Adjust the outer member position to meet the specification as shown in the figure.
After adjustment, tighten the screws (B4x8) which were tightened temporarily in Step 2.

<Universal Type>

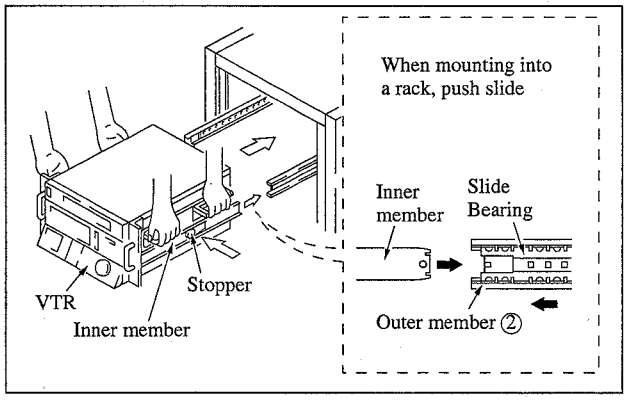


<Wide Type>

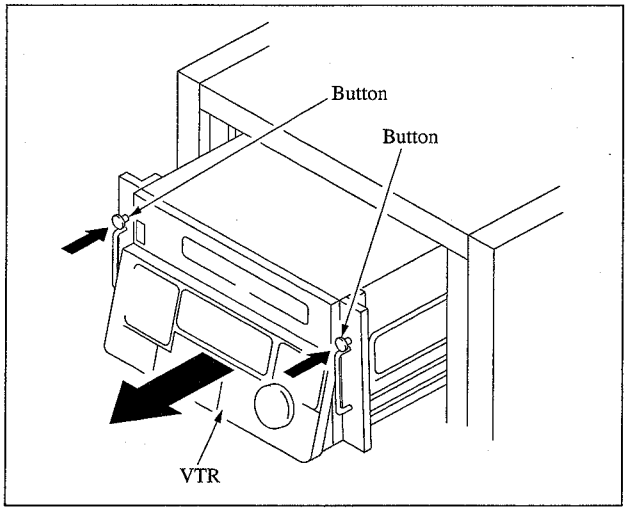




(4) When mounting into a rack, release the stoppers. Mount the unit and tighten the screw which was tightened temporarily in Step 3 after checking that the VTR slides smoothly.
(5) Push the VTR into the rack tightly so as to be locked automatically.

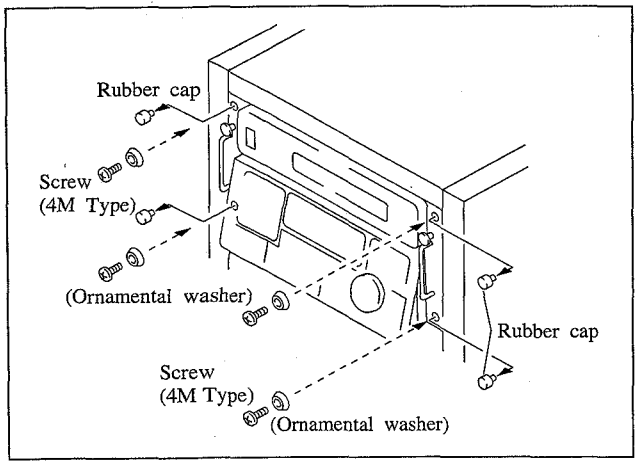


(6) When removing from the rack, pull the VTR at the direction of the arrow pushing the button as shown in the figure.



Fixing:

If the unit is mounted in the 19-inch rack with screws, remove four rubber cap installing on right and left rack angles and fix with M4 type screws.



Note When Mounting One-push L Angle:

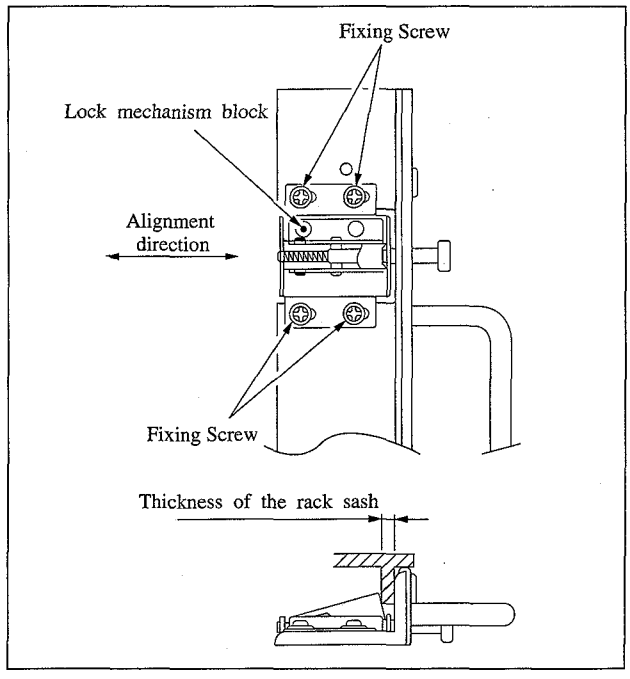
There are a few cases where the play occurs back and forth in lock state when one-push rack L angle is mounted in a 19-inch standard rack.
Adjust the position of the lock mechanism block as the following procedures.

(1) Release the lock state and pull the VTR from the 19-inch rack so as to see lock block.

(2) Loosen the four screws fixing the lock mechanism block.

(3) Move the lock mechanism block by required length and fix the four loosen screws.

(4) Set the lock state again, and confirm whether the alignment has finished or not.



SECTION 2
SERVICE INFORMATION

2-1. SPECIFICATIONS

DVR-20

General

Power requirements	100 to 120 V AC ± 10%, 50/60 Hz
Power consumption	700 VA
Operating conditions	Temperature: 5°C to 40 °C Humidity: 10% to 90% (no condensation) Position: Horizontal (max. 10°C inclination)
Weight	50 kg
Dimensions	436(W)x282(H)x656(D) mm (including control panel and rubber feet)
Recording format	SMPTE D-2 format
Tracks/channels	Digital video and audio (4 channels): 6 tracks/1 field Analog audio (cue channel): 1 track Time code: 1 track CTL: 1 track
Tape speed	131.7 mm/sec
Writing speed (relative speed)	27.387 m/sec
Recording time	M-size cassette: 94 minutes max. S-size cassette: 32 minutes max.
Cassette type	D-1 cassette (M, S)
Recommended tape	Sony metal tape (1500 Oe) or equivalent
Servo lock time	Within 0.5 sec (from standby mode to color capstan servo lock mode)
Tape timer accuracy	±2 frames (with continuous CTL signal)
Edit accuracy	0 frame (with time code)
Error correction	Correction and concealment (Reed-solomon code)
Shuttle speed (picture search possible)	Max. ±100 times normal speed
Fast forward/rewind time	D2M-94M: Within 75 sec D2S-32M: Within 40 sec
Shuttle acceleration	10 m/ sec^2

DVR-20

Video

Sampling frequency	14.3 MHz
Quantization	8 bits/I, Q axis sampling
Channel coding	M^2
Video bandwidth	0 to 5.5 MHz ± 0.3 dB, 6 MHz + 0 dB/-3 dB
S/N ratio	54 dB
Differential gain	Less than 2%
Differential phase	Less than 1°
Moire	0
Y/C delay	Less than 10 ns
Tilt (horizontal and vertical)	Less than 1 %
Low frequency linearity	Less than 2 %
Transient response kell factor (2T pulse)	Less than 1 %
SCH output phase	Based upon RS-170A
Adjustable input level range	±3 dB (analog input only)
Adjustable output range	Video gain: –∞ to +3 dB (factory setting) or ±3 dB
	Chroma gain: –∞ to +3 dB (factory setting) or ±3 dB
	Hue: ±15°
	Setup: ±15 IRE
	Video phase: ±560 ns (280 ns=SC CYCLE/step)
	System phase: +3 to -1 µsec
	Fine: 0.27 ns/step
	Coarse: 280 ns/step
	Subcarrier phase: 360°, 0.35° /step

Digital Audio (DA-1 to DA-4 channels)

Sampling frequency	48 kHz (synchronized to video)
Quantization	20 bits/sample
Frequency response	20 Hz to 20 kHz +0.5 dB/-1.0 dB
Dynamic range	More than 105 dB (at 1 kHz, emphasis ON)
Distortion	Less than 0.02% (at 1 kHz, emphasis ON, operating level)
Crosstalk	Less than -95dB (at 1 kHz, between any two channels)
Wow & flutter	Below measurement limit
Headroom	20 dB
Operating level	+8, +4, 0, –20 dBm adjustable (factory setting: +8 dBm)
Emphasis	T_1 = 15 sec/ T_2 = 15 sec (ON/OFF selectable)
Adjustable input/output level range	–∞ to +12 dB

Analog audio (Cue track)

Frequency response	100 Hz to 12 kHz ± 3 dB
S/N ratio	Better than 50 dB(at 3% distortion)
Distortion	Less than 3% (at 1 kHz, operating level)
Wow & flutter	Less than 0.2% (0.5 to 200 Hz, NAB unweighted)
Operating level	+8, +4, 0, –20 dBm adjustable (factory setting: +8 dBm)
Adjustable input/output level range	–∞ to +6 dB

DVR-20

Input/Output Signal

Video Input	
Analog	1.0 ±0.3 Vp-p, 75 ohms
Digital	Parallel interface: SMPTE T14.224/082A format Serial V/A interface: 0.8 Vp-p, 75 ohms, SMPTE T14.224x2131D
Reference	Composite signal (black burst) Sync and burst: 0.3 Vp-p, 75 ohms
Video Output	
Analog	ANALOG VIDEO-1/2 OUTPUT: 1.0 Vp-p, 75 ohms ANALOG VIDEO-3 OUTPUT: 1.0 Vp-p, 75 ohms Composite/non-composite switchable CHARACTER OUTPUT: 1.0 Vp-p, 75 ohms MONITOR OUTPUT: 1.0 Vp-p, 75 ohms
Digital	Parallel interface: SMPTE T14.224/082A format Serial V/A interface: 0.8 Vp-p, 75 ohms, SMPTE T14.224x2131D
Audio Input	
Analog	CH1, CH2,.CH3, CH4: +28 dBm max. (+8 dBm normal), 150 ohms/600 ohms/HIGH impedance (switchable)
Digital	CH1, CH2, CH3, CH4: AES/EBU format Serial V/A: 0.8 Vp-p, 75 ohm, SMPTE T14.224x2131 D (video & audio)
Cue channel	LINE input: +18 dBm max. (+8 dBm normal), 150 ohms/600 ohms/HIGH impedance (switchable) MIC Input: –44 dBm max.(–60 dBm normal), high impedance
Audio Output	
Analog	CH1, CH2, CH3, CH4: +28 dBm max. (+8 dBm normal)
Digital	CH1, CH2, CH3, CH4: AES/EBU format Serial V/A: 0.8 Vp-p, 75 ohms, SMPTE T14.224x2131D (video & audio)
Cue channel	CUE: +18 dBm max. (+8 dBm normal), low impedance
Monitor output	MONITOR L/R: +28 dBm max. (+8 dBm normal), low impedance
Headphones output level	Variable (adjustable with VR control)
Others	CF PULSE INPUT/OUTPUT: TTL level WFM OUTPUT: 1.0 Vp-p, 75 ohms Video/CTL/RF envelope (A/C, B/D all channels) selectable
Time code	
Input	2.4 V ±1.4 Vp-p, 10 k ohms
Output	2.4 Vp-p, low impedance

Design and specifications are subject to change without notice.

DVR-20P

General

Power requirements	Model for the USA and Canada: 100 to 120 V AC ± 10%, 50/60 Hz Model for European countries: 220 to 230 V AC (or 240 V AC adjustable by Sony personnel), 50/60 Hz Model for the United Kingdam: 240 V AC (or 220 V AC adjustable by Sony personnel), 50/60 Hz
Power consumption	Model for the USA and Canada: 750 VA Model for European countries and the United Kingdam: 850 VA
Operating conditions	Temperature: 5°C to 40 °C Humidity: 10% to 90% (no condensation) Position: Horizontal (max. 10°C inclination)
Weight	50 kg
Dimensions	436(W)x282(H)x656(D) mm (including control panel and rubber feet)
Recording format	D-2 format
Tracks/channels	Digital video and audio (4 channels): 8 tracks/1 field Analog audio (cue channel): 1 track Time code: 1 track CTL: 1 track
Tape speed	131.7 mm/sec
Writing speed (relative speed)	30.4 m/sec
Recording time	M-size cassette: 94 minutes max. S-size cassette: 32 minutes max.
Cassette type	D-1 cassette (M, S)
Recommended tape	Sony metal tape (1500 Oe) or equivalent
Servo lock time	Within 0.5 sec (from standby mode to color capstan servo lock mode)
Tape timer accuracy	±2 frames (with continuous CTL signal)
Edit accuracy	0 frame (with time code)
Error correction	Correction and detection (Reed-solomon code)
Shuttle speed (picture search possible)	Max. ±100 times normal speed
Fast forward/rewind time	D2M-94M: Within 75 sec D2S-32M: Within 40 sec
Shuttle acceleration	10 m/ sec^2

DVR-20P

Video

Sampling frequency	17.7 MHz ±135°
Quantization	8 bits sampling
Channel coding	M^2
Video bandwidth	0 to 6 MHz ± 0.3 dB, 6.5 MHz + 0 dB/-3 dB
S/N ratio	54 dB
Differential gain	Less than 2%
Differential phase	Less than 1°
Moire	0
Y/C delay	Less than 20 ns
Tilt (horizontal and vertical)	Less than 1 %
Low frequency linearity	Less than 2 %
Transient response kell factor (2T pulse)	Less than 1 %
SCH output phase	Based upon CCIR Report 624-3
Adjustable input level range	±3 dB (analog input only)
Adjustable output range	Video gain: –∞ to +3 dB (factory setting) or ±3 dB
	Chroma gain: –∞ to +3 dB (factory setting) or ±3 dB
	Burst/Chroma phase: ±15°
	Black level: ±100 mV
	Video phase: ±450 ns (225 ns=SC CYCLE/step)
	System phase: +3 to -1 µsec
	Fine: 0.22 ns/step
	Coarse: 225.7 ns/step
	Subcarrier phase: 360°, 0.35° /step

Digital Audio (DA-1 to DA-4 channels)

Sampling frequency	48 kHz (synchronized to video)
Quantization	20 bits/sample
Frequency response	20 Hz to 20 kHz +0.5 dB/-1.0 dB
Dynamic range	More than 105 dB (at 1 kHz, emphasis ON)
Distortion	Less than 0.02% (at 1 kHz, emphasis ON, operating level)
Crosstalk	Less than -95dB (at 1 kHz, between any two channels)
Wow & flutter	Below measurement limit
Headroom	20 dB
Operating level	+8, +4, 0, –20 dBm adjustable (factory setting: +8 dBm)
Emphasis	T_1 = 50 µsec/ T_2 = 15 µsec (ON/OFF selectable)
Adjustable input/output level range	–∞ to +12 dB

Analog audio (Cue track)

Frequency response	100 Hz to 12 kHz ± 3 dB
S/N ratio	Better than 50 dB(at 3% distortion)
Distortion	Less than 3% (at 1 kHz, operating level)
Wow & flutter	Less than 0.2% (0.5 to 200 Hz, CCIR weighted)
Operating level	+8, +4, 0, –20 dBm adjustable (factory setting: +8 dBm)
Adjustable input/output level range	–∞ to +6 dB

DVR-20P

Input/Output Signal

Video Input	
Analog	1.0 ±0.3 Vp-p, 75 ohms
Digital	Parallel interface: ECL balanced Serial V/A interface: 0.8 Vp-p, 75 ohms
Reference	Composite signal (black burst) Sync and burst: 0.3 Vp-p, 75 ohms
Video Output	
Analog	ANALOG VIDEO-1/2 OUTPUT: 1.0 Vp-p, 75 ohms ANALOG VIDEO-3 OUTPUT: 1.0 Vp-p, 75 ohms/Composite/non-composite switchable CHARACTER OUTPUT: 1.0 Vp-p, 75 ohms MONITOR OUTPUT: 1.0 Vp-p, 75 ohms
Digital	Parallel interface: ECL balanced Serial V/A interface: 0.8 Vp-p, 75 ohms
Audio Input	
Analog	CH1, CH2,.CH3, CH4: +28 dBm max. (+8 dBm normal), 150 ohms/600 ohms/HIGH impedance (switchable)
Digital	CH1, CH2, CH3, CH4: AES/EBU format Serial V/A: 0.8 Vp-p, 75 ohm
Cue channel	LINE input: +18 dBm max. (+8 dBm normal), 150 ohms/600 ohms/HIGH impedance (switchable) MIC Input: –44 dBm max.(–60 dBm normal), high impedance
Audio Output	
Analog	CH1, CH2, CH3, CH4: +28 dBm max. (+8 dBm normal)
Digital	CH1, CH2, CH3, CH4: AES/EBU format Serial V/A: 0.8 Vp-p, 75 ohms
Cue channel	CUE: +18 dBm max. (+8 dBm normal), low impedance
Monitor output	MONITOR L/R: +28 dBm max. (+8 dBm normal), low impedance
Headphones output level	Variable (adjustable with VR control)
Others	CF PULSE INPUT/OUTPUT: TTL level WFM OUTPUT: 1.0 Vp-p, 75 ohms Video/CTL/RF envelope (A/C, B/D all channels) selectable
Time code	
Input	2.4 V ±1.4 Vp-p, 10 k ohms
Output	2.4 Vp-p, low impedance

Design and specifications are subject to change without notice.

2-2. PRINTED CIRCUIT BOARD FUNCTION

① The board without (N) or (P) is used in both NTSC and PAL models.
② "SP CODE" means Supply code.
③ "PCB" in SP CODE column means Printed Circuit Board.
"MCB" in SP CODE column means Mounted Circuit Board.

BLOCK	BOARD	CIRCUIT FUNCTION	LOCATION	SP CODE
PROCESSOR	AD-73 (N)	Audio A/D, D/A Converter, Video A/D Converter	Card Rack ①	O(MCB)
	AD-73 (P)			O(MCB)
	DF-48×3	IC Exchange Board (Included in AD-73 Board)		O(PCB)
	EN-99 (N)	Video/Audio Shuffling, Outer/Inner Encoder, Channel Encoder		O(MCB)
	EN-99 (P)			O(MCB)
	DE-37 (N)	Inner/Outer Decoder, Audio Error Concealment, Video/Audio Deshuffling		O(MCB)
	DE-36 (P)			O(MCB)
	PR-157 (N)	Video Error Concealment, Signal Processor		O(MCB)
	PR-163 (P)			O(MCB)
	DIF-10 (N)	〔Option〕 Serial Interface		U
	DIF-10P (P)			U
RF	EQ-29 (N)	PB EQ Amplifer, Channel Decoder	Card Rack ②	O(MCB)
	EQ-29 (P)			O(MCB)
	RE-41 ×2	Included in EQ-29 Board		O(MCB)
LONGITUDE	AE-15 (N)	CUE, TC, CTL REC/PB Amp	Card Rack ②	O(MCB)
	AE-15 (P)			O(MCB)
SYSTEM CONTROL & SERVO CONTROL	SV-133	Servo CPU	Card Rack ②	O(MCB)
	SP-15	Reel, Capstan, Drum Servo Control		O(MCB)
	SY-165	System Control		O(MCB)
	DT-16 (N)	Dynamic Tracking Control		O(MCB)
	DT-16 (P)			O(MCB)
	DF-45	Included in DT-16 Board		O(MCB)

BLOCK	BOARD	CIRCUIT FUNCTION	LOCATION	SP CODE
HEAD DRUM DDH-26A (N) DDH-27A (P)	DR-132	PB Amplifer	Drum (Inner)	O
	DR-135 ×2	REC, DT Head Relay	Drum (Inner) DDR-26(N) DDR-27(P)	U
	DR-136 ×2	Erase Head Relay		U Inner Drum:s
	DR-175 ×2	PB Head Relay		U
	DR-152	REC, PB Head Relay	Drum (Lower)	U
	DR-134	REC, PB Head Rotary Transformer Relay	→(Flange)	U
	DR-137 ×2	Erase Head Rotary Transformer Relay	→(Flange)	U Drum Ass'y:s
	DR-151	Erase Head Relay	→(Outer stator)	U
	DR-133	Brush Slip Ring Relay	Drum (Lower) Brush Slip Ring Ass'y	U Brush SlipRing
	DR-159	Brush Relay (Flexible)		U Ass'y:s
OTHERS	REC-11 (N)	REC Amplifer	Upper	O(MCB)
	REC-11 (P)			O(MCB)
	RE-83 ×4	Included in REC-11 Board		O(MCB)
	DM-63	NOVRAM Timer		O(MCB)
	MD-50	Motor Driver, DT Driver	Left Side	O(MCB)
	PD-53	Pinch Sub Solenoide Driver		O(MCB)
	SP-18	Included in MD-50		O(PCB)
	UC-2	Ultra Sonic Guide Control		O(MCB)
	ED-24 (N)	Error Detector	Use Ass'y (C20: ED Ass'y)	O(MCB)
	ED-24 (P)			O(MCB)
	IF-331	Parallel I/O, RS422, GPIB, RS232C	Connector Panel (Remote)	O(MCB)
	VM-05 (N)	Video D/A Converter	Upper	O(MCB)
	VM-05 (P)			O(MCB)
	LO-14	Audio Line Amplifer	Rear	O(MCB)

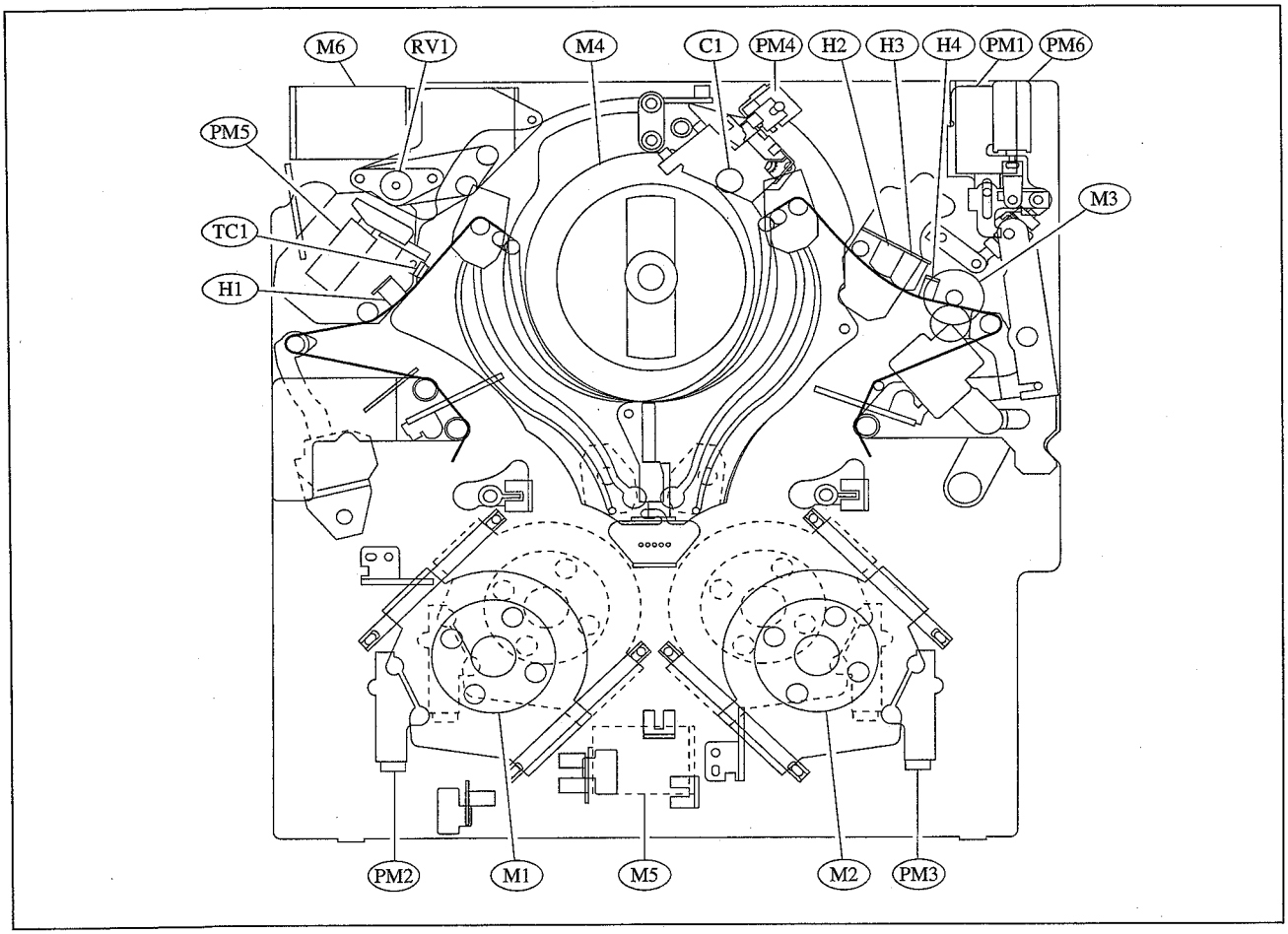
BLOCK	BOARD	CIRCUIT FUNCTION	LOCATION	SP CODE
POWER SUPPLY	PS-255	Power Supply	Power Supply (Left Side)	O(MCB)
	FU-41	Fuse Board (Included in PS-255 Board)		O(PCB)
	RE-42	Switching Regulator		O(MCB)
	CT-133	Regulator Control		O(MCB)
MOTHER BOARD	MB-348	RF/System/Servo Mother	Card Rack ②	O(MCB)
	MB-349	Processor Board Mother	Card Rack ①	O(MCB)
	CN-541	SIF Mother		O(MCB)
FRAME <CASSETTE COMPART-MENT>	PC-37 ×2	Cassette Up/Down	Cassette Compartment Ass'y	O(PCB)
	PC-66	Cassette In/Size		O(PCB)
	CN-169	Cassette Sensor Relaying		O(PCB)
<SENSOR>	LE-62	Tape Thick, Tape HC, REC Inhibit	Tape Transport	U CD Block Ass'y:s
	TR-43			U
	PC-42 ×6	Reel Position (M) (S)/User Center (M) (S), User-T, S Sensor		O(PCB)
	PC-65	Tape Center Sensor	End Sensor (C) Ass'y	O(PCB)
	PC-63 ×2	Tape Top/End Senso	T Guide Ass'y S Guide Base Ass'y	U Tape Sensor Ass'y:s
	SE-72	Sensor Relay	Front	O(MCB)
	SW-213	Eject Switch		O(PCB)
	PE-18	Power Indicator		O(PCB)

BLOCK	BOARD	CIRCUIT FUNCTION	LOCATION	SP CODE
FRAME	PD-53	Tape Cleaner	FE/TC Ass'y	O(MCB)
<TTP>	AH-39	Full Erase Head		O(PCB)
	AH-38	Channel Erase/RP Head	Stationary Head Ass'y	O(PCB)
	CH-26	Confi Head		O(PCB)
	CN-309	Head Cleaner	Cleaing Roller	Cleaning U Roller (P) Ass'y:s
	CN-171	DT Drive/Capstan Pinch Relay	Upper	O(PCB)
	CN-481 ×2	S/T Reel Motor Relay	S/T/Reel Motor	O(PCB)
	CN-565	Slider (S) UD Contact	Slider (S)	S (MCB)
	CN-625	Slider (T) UD Contac	Slider (T)	S (MCB)
	UD-3 UD-4	USG (S) Relay	Slider (S)	O(PCB) O(PCB)
	UD-3 UD-5	USG (T) Relay	Slider (T)	O(PCB) O(PCB)
	MT-47 ×2	Reel Position/Loading Motor Relay	Reel Shift Motor Loading Motor	O(PCB)
	DET-18	Tension Sensor (DME)	T Tension Regulator Ass;y	O(MCB)
	DET-19		S Tension Regulator Ass'y	O(MCB)
	CN-590	Tension Regulator Relay	S Tension Regulator Ass'y	O(PCB)

BLOCK	BOARD	CIRCUIT FUNCTION	LOCATION	SP CODE
FRAME <Connector Panel> (Remote & Digital I/O)	RM-98	Digital Video, Remote (D-sub)	Rear Connector Panel	O(MCB)
	CN-233	Digital Audio (XLR)		O(MCB)
	FP-30	Control Panel Relay	Front	O(MCB)
FRAME <Connector Panel> (Analog I/O)	CN-324	Analog Video (BNC)	Rear Connector Panel	O(PCB)
	CN-325 (UC) (EK)	Analog Audio (XLR)		O(PCB)
	CN-396(J)	Analog Audio (XLR)		O(MCB)
	FC-61	Fan Motor Rotation Control		O(MCB)
	VR-98	Phone Jack	Front	O(MCB)
EXTENSION	EX-185	For Card Rack ②	Packing	S(MCB)
	EX-241	For REC-11		S(MCB)
	EX-341	For Card Rack ①		S(MCB)

2-3. MAIN PARTS LOCATION

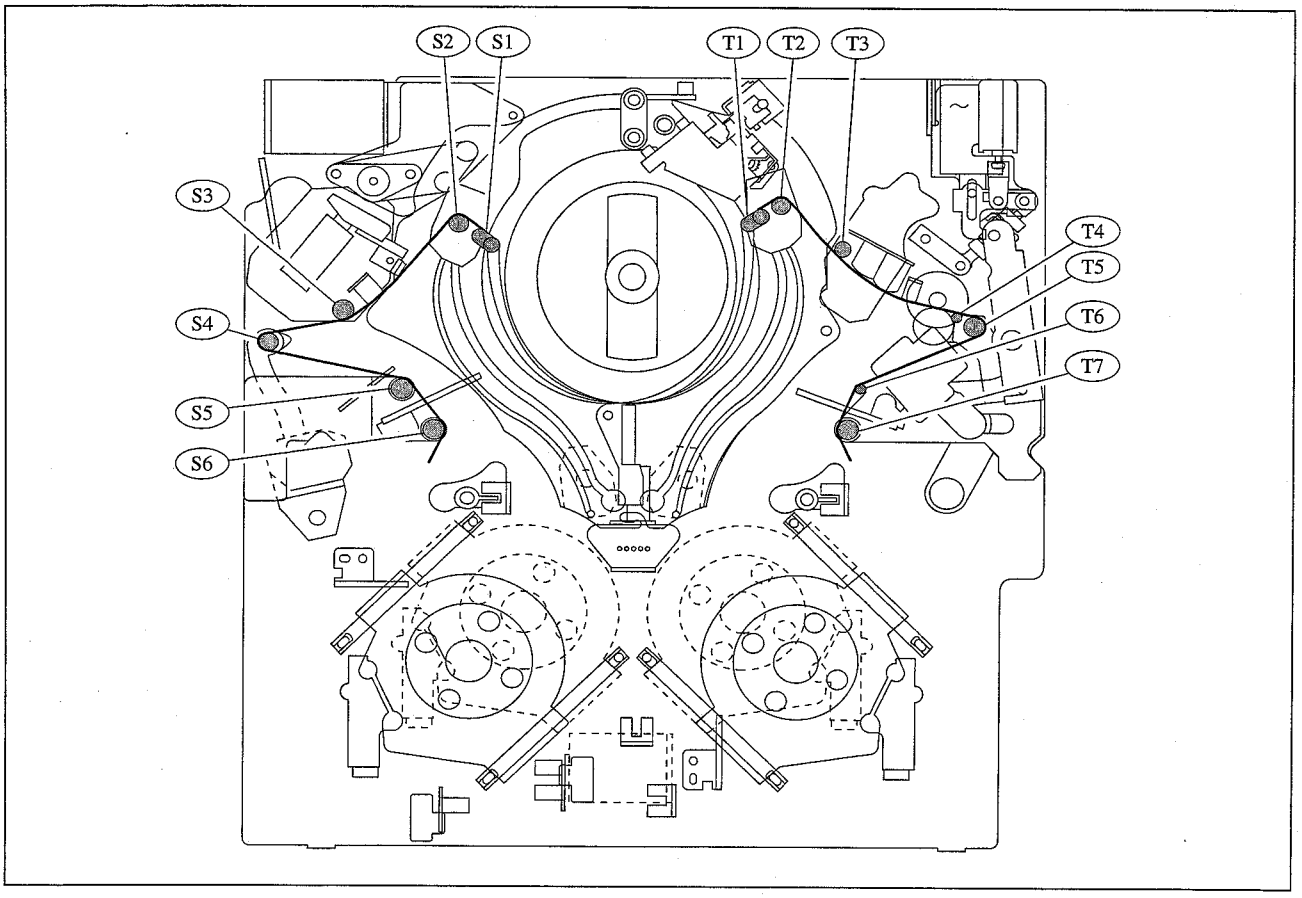
2-3-1. Tape Transport ①



HEAD, MOTOR, SOLENOID, etc.

C1	Cleaning Roller
H1	Full Erase Head
H2	CUE/CTL/TC Erase Head
H3	CUE/CTL/TC R/P Head
H4	CTL/TC CONFIDENCE HEAD
M1	S Reel Motor
M2	T Reel Motor
M3	Capstan Motor
M4	Drum Motor
M5	Reel Position Shift Motor
M6	Loading Motor
PM1	Pinch Solenoid
PM2	S Brake Solenoid
PM3	T Brake Solenoid
PM4	Cleaning Roller Solenoid
PM5	Tape Cleaner Solenoid
PM6	Sub Pinch Solenoid
RV1	Threading Potentiometer
TC1	Tape Cleaner

2-3-2. Tape Transport ②

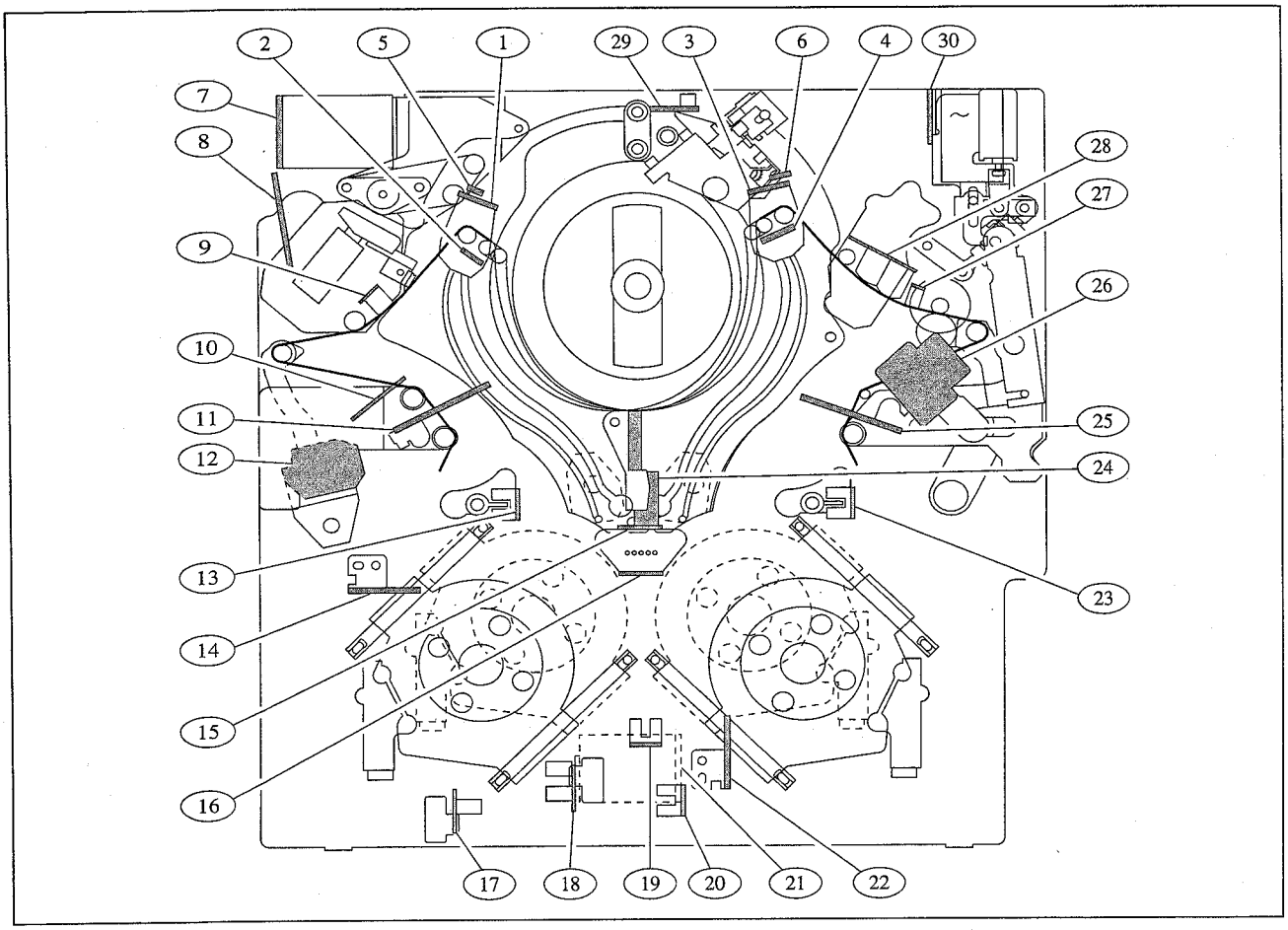


GUIDE

S1	Entrance Guide (S1)
S2	Guide S2
S3	Guide S3
S4	Tension Regulator Guide S4
S5	Guide S5
S6	Guide S6

T1	Exit Guide (T1)
T2	Guide T2
T3	Guide T3
T4	Guide T4
T5	Guide T5
T6	Tension Regulator Guide T6
T7	Guide T7

2-3-3. Tape Transport ③



PRINTED CURCUIT BOARD

1. UD-4 Board: USG (S) Relay
2. UD-3 Board: USG (S) Relay
3. UD-5 Board: USG (T) Relay
4. UD-3 Board: USG (T) Relay
5. CN-565 Board: Slider (S) UD Contact
6. CN-625 Board: Slider (T) UD Contact
7. MT-47 Board: Loading Motor Relay
8. PD-53 Board: Tape Cleaner
9. AH-39 Board: Full Erase Head
10. CN-590 Board: Tension Regulator
11. PC-63 Board: Tape End Sensor
12. DET-19 Board: S Tension Sensor
13. PC-42 Board: USER-S Sensor
14. CN-481 Board: S Reel Motor Relay
15. TR-43 Board: Coding Hole Sensor (Transistor)
16. LE-62 Board: Coding Hole Sensor (LED)
17. PC-42 Board: Reel Position (S) Sensor
18. PC-42 Board: Reel Position (M) Sensor
19. PC-42 Board: User Center (S) Sensor
20. PC-42 Board: User Center (M) Sensor
21. MT-47 Board: Reel Position Relay
22 CN-481 Board: T Reel Motor Relay
23. PC-42 Board: USER-T Sensor
24. PC-65 Board: Tape Center Sensor
25. PC-63 Board: Tape Top Sensor
26. DET-18 Board: T Tension Sensor
27 CH-26 Board: Confidence Head
28 AH-38 Board: Channel Erase/RP Head
29. CN-309 Board: Cleaning Roller Relay
30. CN-309 Board: Sub Solenoid Relay

PRINTED CIRCUIT BOARD

101. AD-73 Board: Audio A/D, D/A Converter, Video A/D Converter
102. AE-15 Board: CUE, TC, CTL, REC/PB Amp
103. CN-169 Board: Cassette Sensor Relaying
104. CN-171 Board: DT Drive/Capstan Pinch Relay
105. RM-98 Board: Digital Video, Remote (D-sub)

106. CN-324 Board: Analog Video (BNC)
107. CN-325 Board: Analog Audio (XLR)
CN-396 Board: Analog Audio (XLR)
108. CN-233 Board: Digital Audio (XLR)
109. CT-133 Board: Regulator Control
110. DE-37/-36 Board: Inner/Outer Decoder, Audio Error Concealment, Video/Audio Deshuffling
111. DM-63 Board: NOVRAM Timer
112. DT-16 Board with DF-45 Board: Dynamic Tracking Control
113. ED-24 Board: Error Detector
114. EN-99 Board: Video/Audio Shuffling, Outer/Inner Encoder, Channel Encoder
115. EQ-29 Board: PB EQ Amplifer, Channel Decoder

116. FP-30 Board: Control Panel Relay
117. FU-41 Board: Fuse Board (Included in PS-255 Board)
118. IF-331 Board: Parallel I/O, PS422, GPIB, RS232C
119. LO-14 Board: Audio Line Amplifer
120. MB-348 Board: RF/System/Servo Mother

121. MB-349 Board: Processor Board Mother
122. MD-50 Board: Motor Driver, DT Driver
123. PC-37 Board: Cassetter Up/Down
124. PC-37 Board: Cassetter UP/Down
125. PC-66 Board: Cassette In/Size

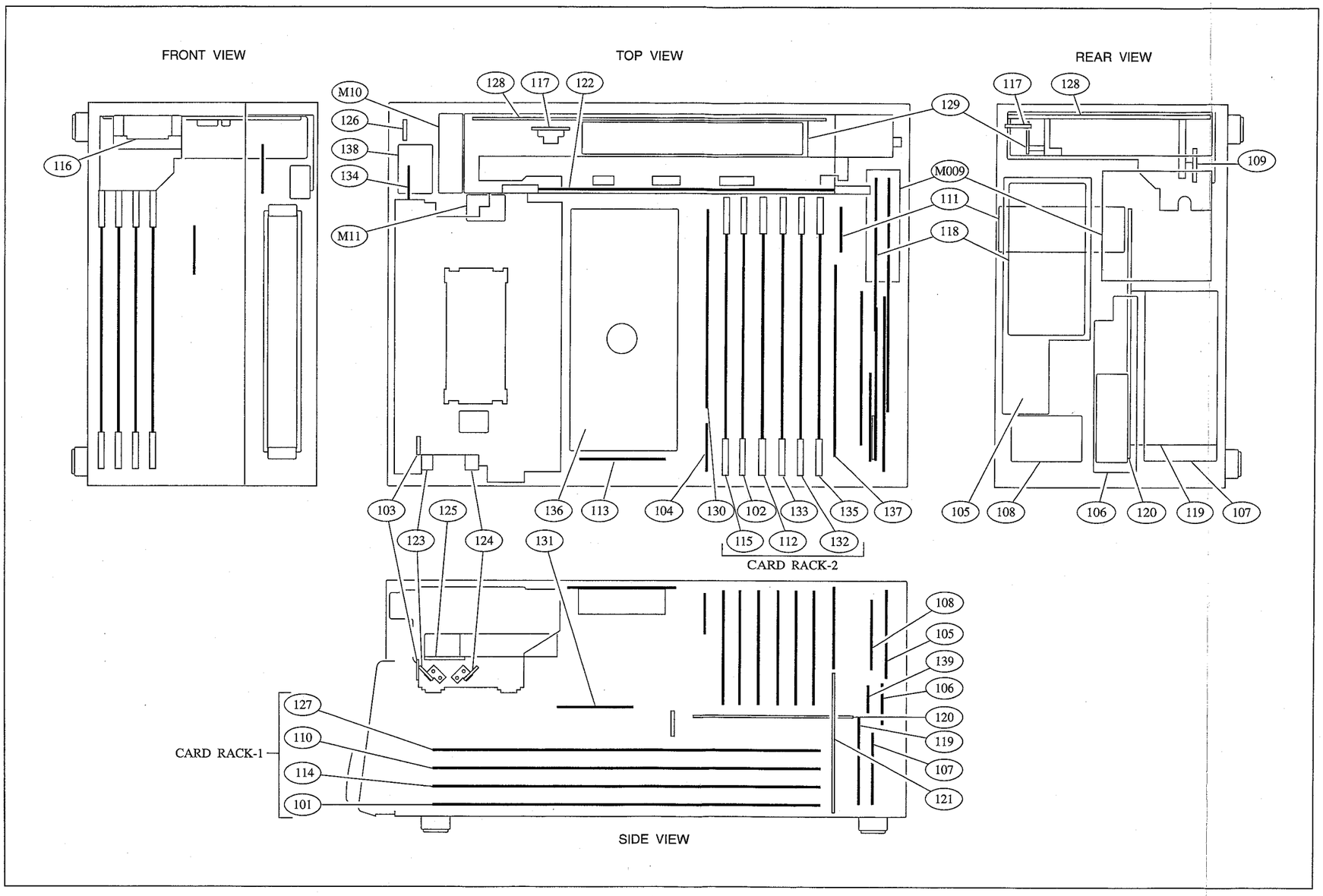
126. PE-18 Board: Power Indicator
127. PR-157/-163 Board: Video Error Concealment, Signal Processor
128. PS-255 Board: Power Supply
129. RE-42 Board: Switching Regulator
130. REC-11 Board: REC Amplifer

131. SE-72 Board: Sensor Relay
132. SP-15 Board: Reel, Capstan, Drum Servo Control
133. SV-133 Board: Servo CPU
134. SW-213 Board: Eject Switch
135. SY-165 Board: System Control

136. UC-2 Board: Ultra Sonic Guide Control
137. VM-05 Board: Video D/A Converter
138. VR-98 Board: Phone Jack
139. FC-61 Board: Fan Motor Rotation Control

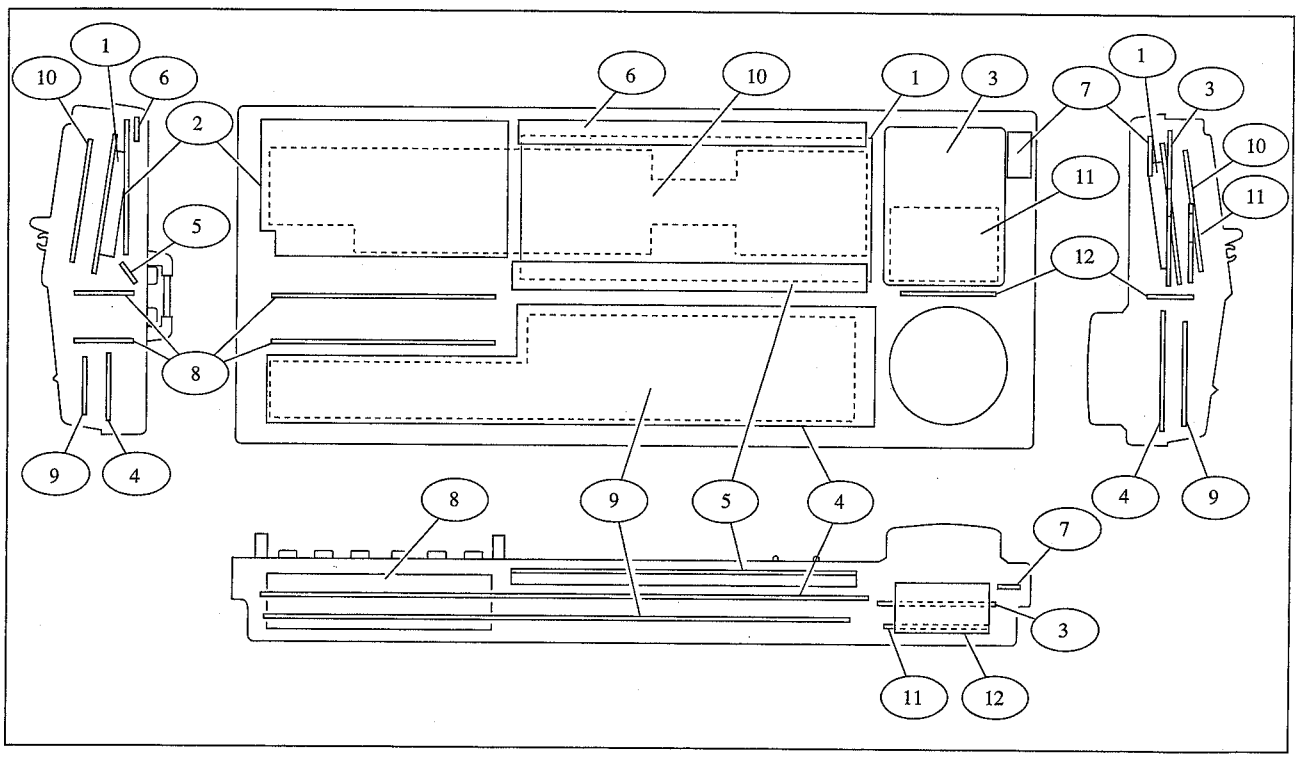
MOTOR

M11. Cassette Compartment Motor
M10. Fun Motor
M009. Fun Motor


FRONT VIEW
TOP VIEW
REAR VIEW
116
M10
126
138
134
M11
128
117
122
129
M009
111
118
117
128
109
103
125
123
124
131
136
113
104
130
102
133
135
137
115
112
132
CARD RACK-2
105
108
106
120
119
107
CARD RACK-1
127
110
114
101
108
105
139
106
120
119
107
121
SIDE VIEW

2-3-4. Function Control Panel (Option)

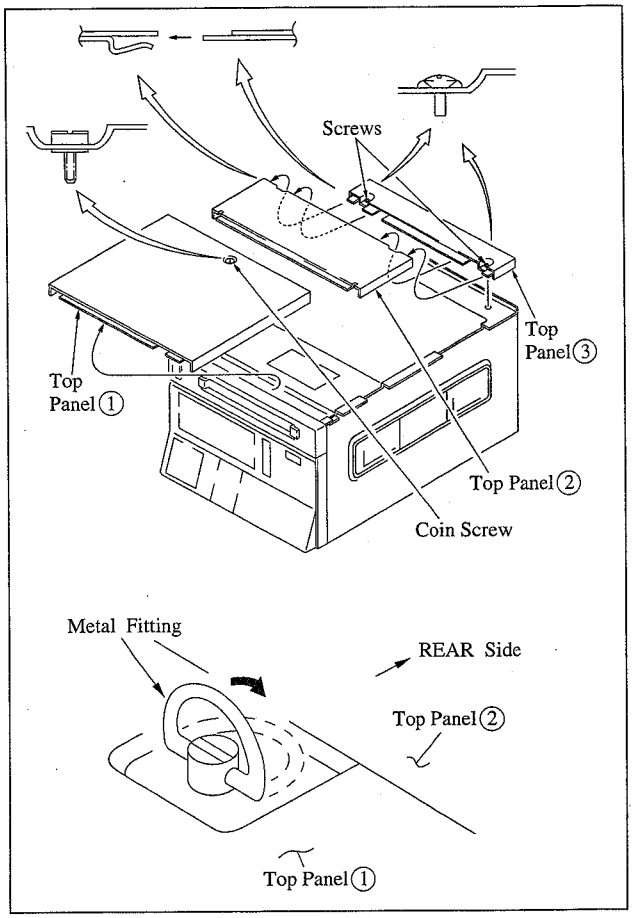
1. FL Panel (Fluorescence Luminesent Panel)
2. LD-44 Board: Audio Level Meter
3. SW-461 Board: Monitor Select
4. SW-462 Board (For BKDV-201): Main Switch
   SW-462A Board (For BKDV-200): Main Switch
5. ES-03 Board: Function Switch
6. LE-96 Board: Channel Condition
7. SW-465 Board (For BKDV-201): Mode Shift Switch
8. VR-121 Board: Audio VOL
9. CP-174 Board: CPU
10. CP-178 Board: CPU
11. CN-544 Board: 8-pin Connector
12. DET-11 Board: Switch Dial Detector



2-4. REMOVAL OF CABINETS

Removal of Top Panels

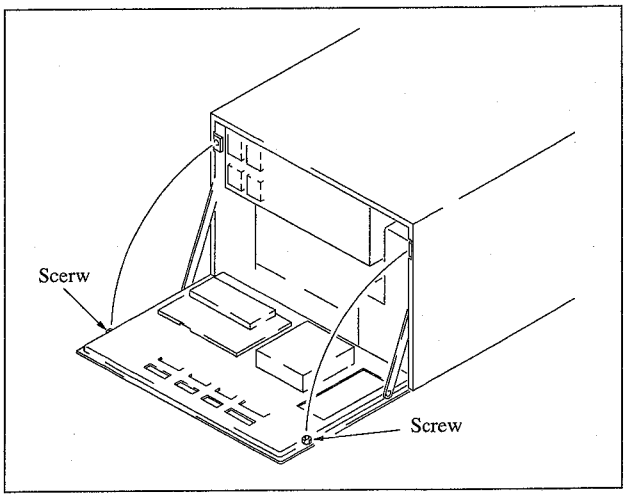
(1) Loosen the coin screw fully, and remove the Top Panel ①.
(2) Remove the Top Panel ② from the Top Panel ③ as shown in the figure.
(3) Loosen fully the two screws in the figure, and remove the Top Panel ③.



Note: After installed the top panels, set the metal fitting installed on the coin screw of the top panel ① to REAR side.

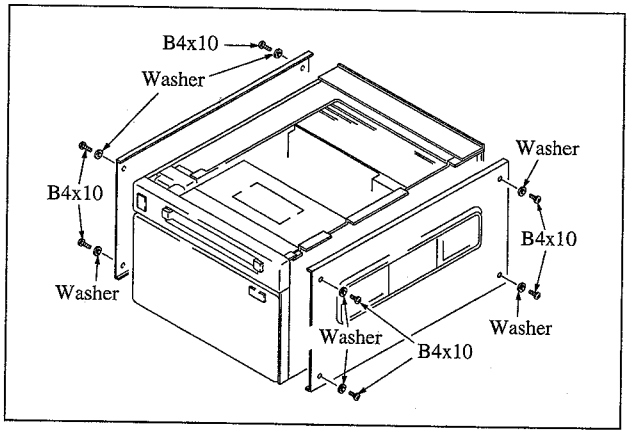
Opening of connector panel

Loosen fully the two screws in the figure, and then open the connector panel.



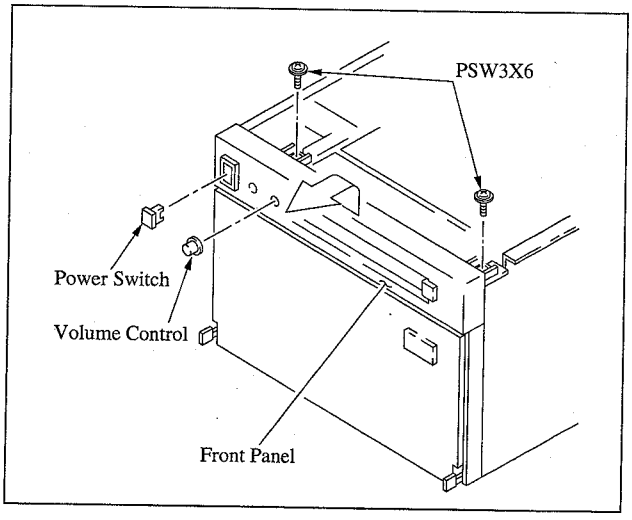
Removal of side panels

After opening the connector panel and removing the top panels, remove the eight screws (B4x10) and the eight washers as shown in the figure. (Four on each side)



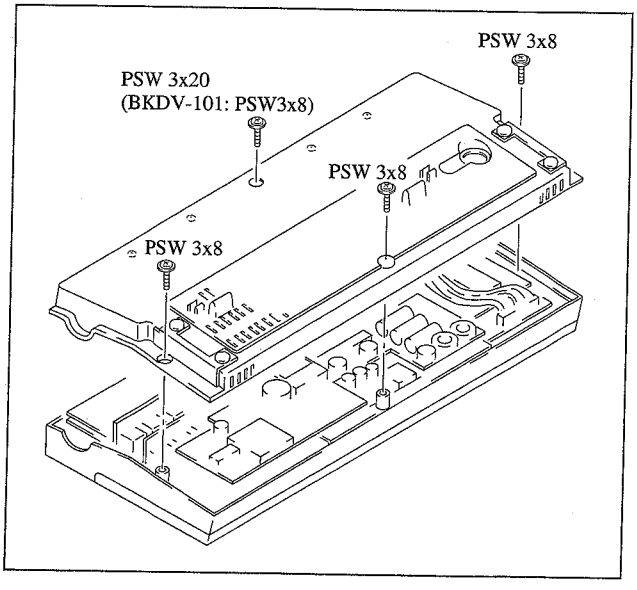
Removal of front panel

After removing the top panel, remove the power switch button and control knobs.
Remove the two screws (PSW3x6) as shown in the figure.
Then, lift up the front panel slightly and remove it in the direction of the arrow.



Removal of bottom panel of function control panel

Remove the four screws (PSW3x8) as shown in the figure.

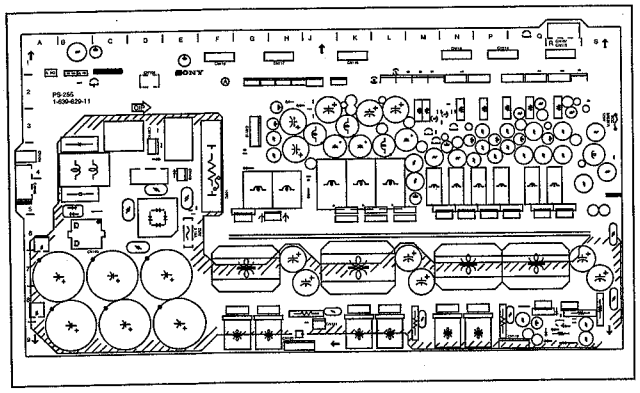


2-5. NOTES ON POWER UNIT

2-5-1. Primary Circuit & Electric Shock

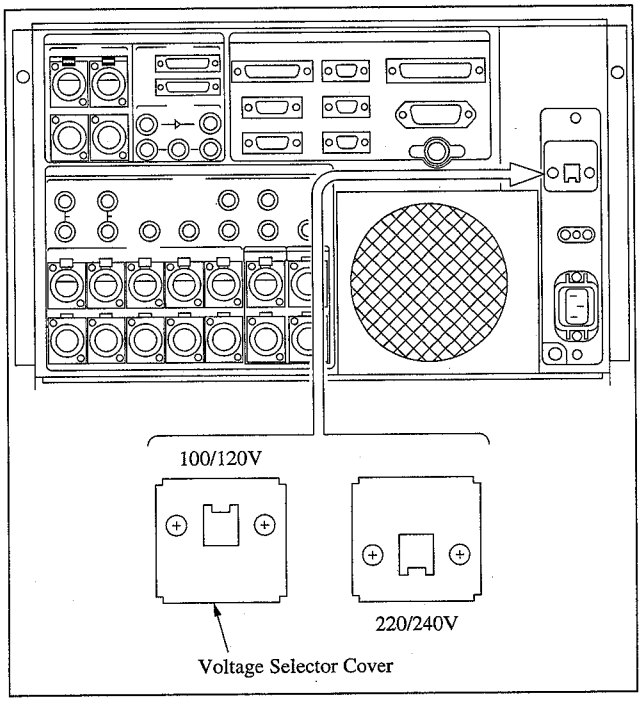
The power supply section consists of PS-255, CT-133, RE-42 and FU-41 boards, and also the primary side circuit peripheral components.
These parts are contained in a single case, forming a power supply unit.
All of CT-133 board and the shaded portion of PS-255 board are on the primary side circuit, and are thus at mains potential. Take care to avoid electric shock.
The heat sink in the primary side circuit on PS-255 board is also connected to the primary circuit.
Even after the power is turned OFF, a high voltage will remain on the shaded portion on PS-255 board. Therefore, be careful when handling the board.

PS-255 Board (Component side)



2-5-2. Notes on Voltage Selector

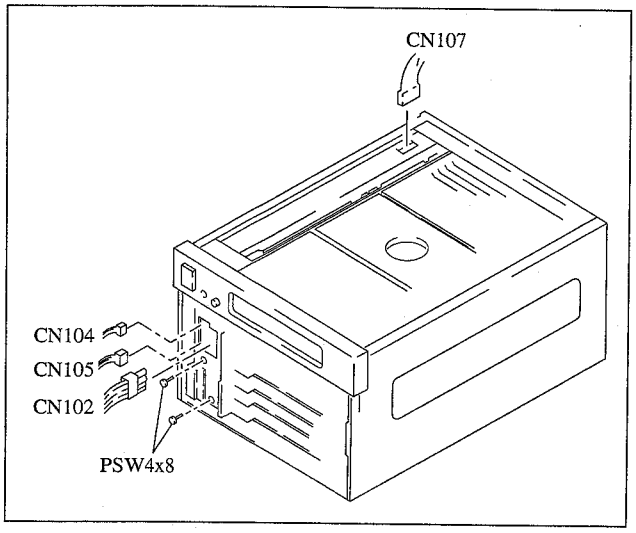
The voltage selector is factory set to the destination local power supply voltage.
Repair parts supplied from Sony Parts Center are set to 220-240V for safety. When replacing the power unit, check the voltage is set to 100-120V or 220-240V according to the local power supply. Be sure to set the voltage selector to the local power supply before the power switch is turned ON. The voltage is changed by the position of the voltage selector cover as shown in the figure.



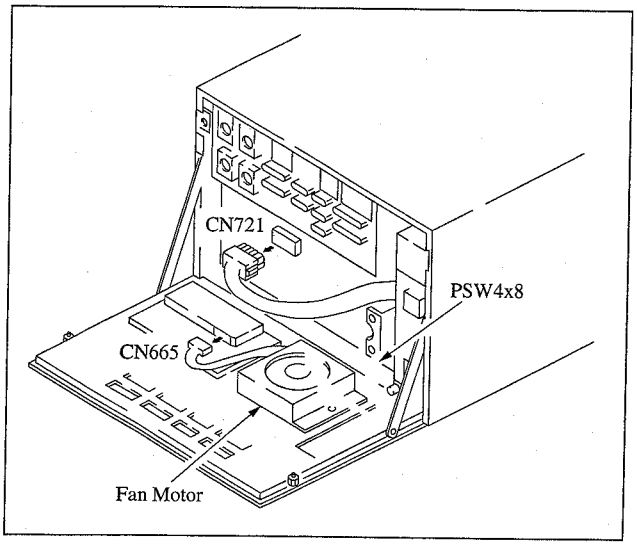
2-5-3. Removal of Power Supply

Note: Before removing the power supply, turn the power switch OFF and also pull out the power cord.

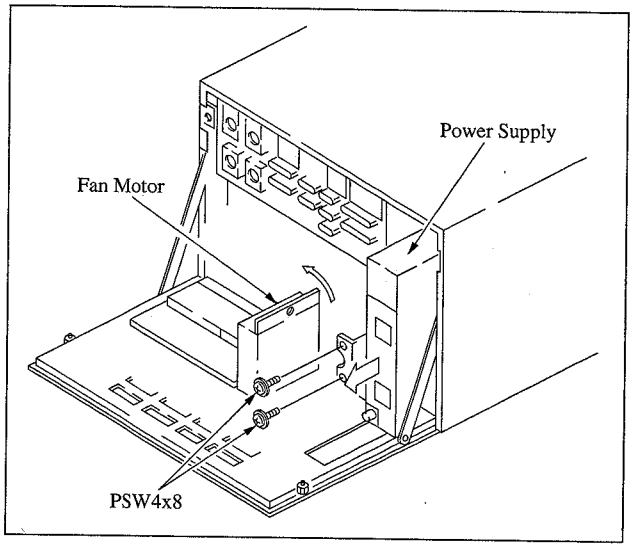
(1) Open the blank panel or function control panel.
(For details, refer to Section 1-7 "Installing the Function Control Panel.")
(2) Disconnect the connectors CN102, CN104 and CN105.
(3) Remove the two screws (PSW4x8).
(4) Remove the top panel.
(5) Disconnect the connector CN107.



(6) Open the connector panel.
(7) Remove the harness as shown in the figure below from the harness clamper, and disconnect the connector CN721.
(8) Disconnect the connector CN665 from CN-230 board.
(9) Remove the screws (PSW4x8) which install the fan motor, and set the fan motor in the direction of the arrow.



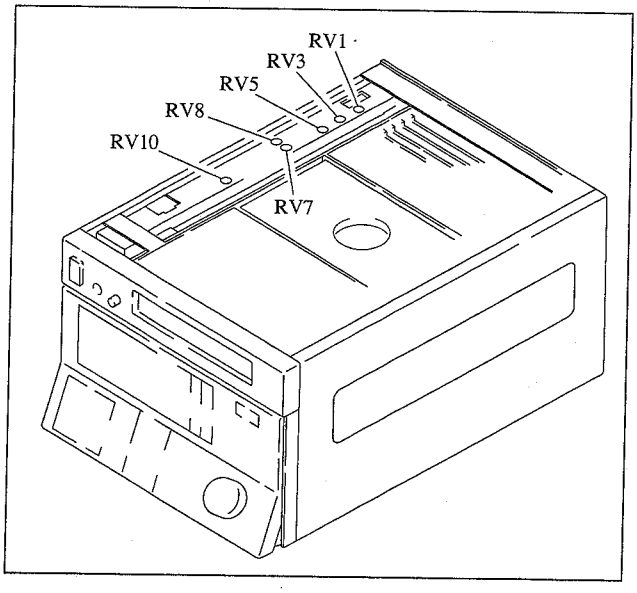
(10) Remove the two screws (PSW4x8).
(11) Draw out the power supply in the direction of the arrow.



2-5-4. Power Supply Adjustment

Remove the top panels, turn the power ON, and check the operation of the power supply.
In this condition, RE-42 board can be adjusted through the holes at the top of the power supply case. When adjusting and measuring at the TP terminals inside the power supply case, remove the power supply cover according to Section 2-5-5. For details of the adjustment procedures, refer to Section 8 "Power Supply Alignment."

Note: Almost all of the circuits inside the power supply case are on the primary side circuit.
When inserting an alignment screwdriver into the case, be very careful not to touch other conductive parts.



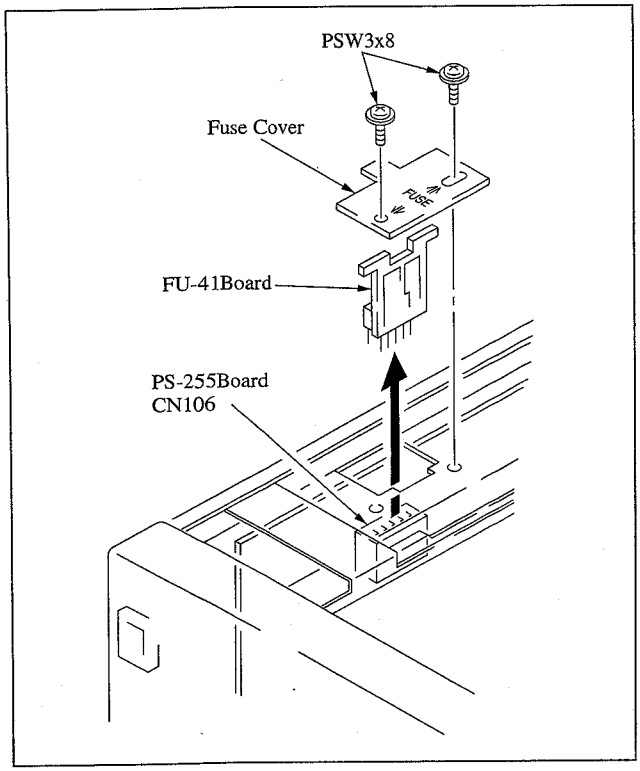
2-5-5. Removal of FU-41/PS-255/RE-42/CT-133 Boards

Note: Before checking the power supply unit, turn the power OFF and pull out the power cord. Even after the power is turned OFF, a high voltage will remain on the primary side circuit on PS-255 board.
Be careful, when handling the board.

Removal of FU-41 board

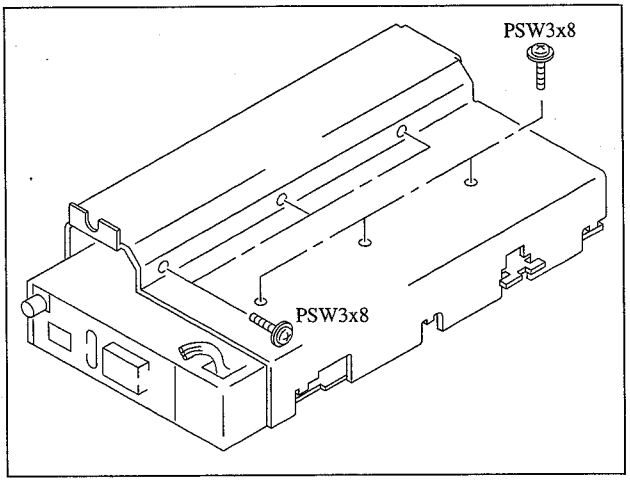
When FU-41 board is removed, it is not necessary to remove the power supply unit from VTR.

(1) Remove the two screws (PSW3x8) and then remove the fuse cover as shown in the figure.
(2) Pull out FU-41 board from CN106 connector on PS-255 board in the direction of the arrow.

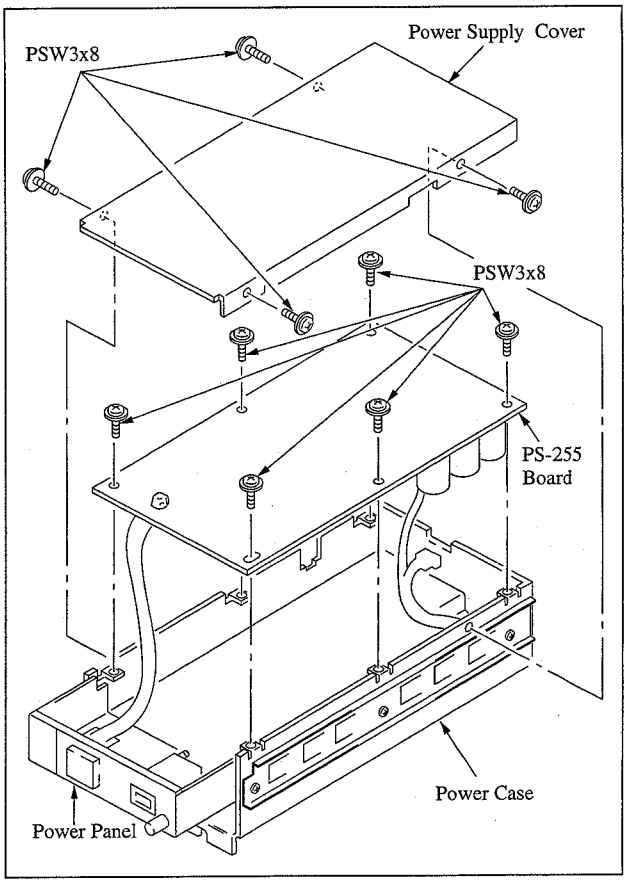


Removal of PS-255/RE-42/CT-133 board

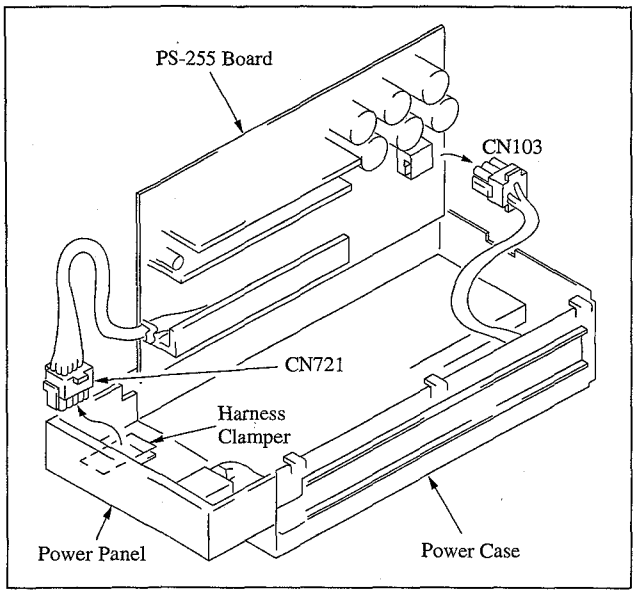
(1) After removing the power supply, remove the six screws (PSW3x8) as shown in the figure.



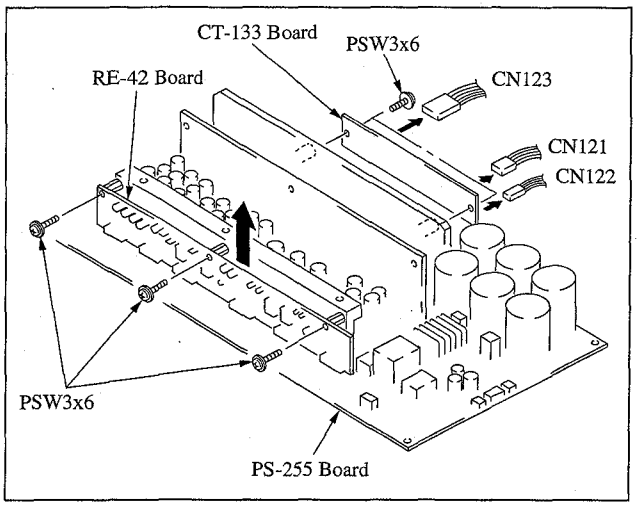
(2) After removing the four screws (PSW3x8) as shown in the figure and the power supply cover, remove the six screws (PSW3x8).



(3) Disconnect the connector CN721 from the harness clamper and the connector CN103 on PS-255 board.



(4) Romove the three screws (PSW3x6) as shown in the figure and pull out RE-42 board from PS-255 board in the direction of the arrow.
Then, disconnect CN121, CN122 and CN123 connectors and remove the two screws (PSW3x6) and remove CT-133 board.



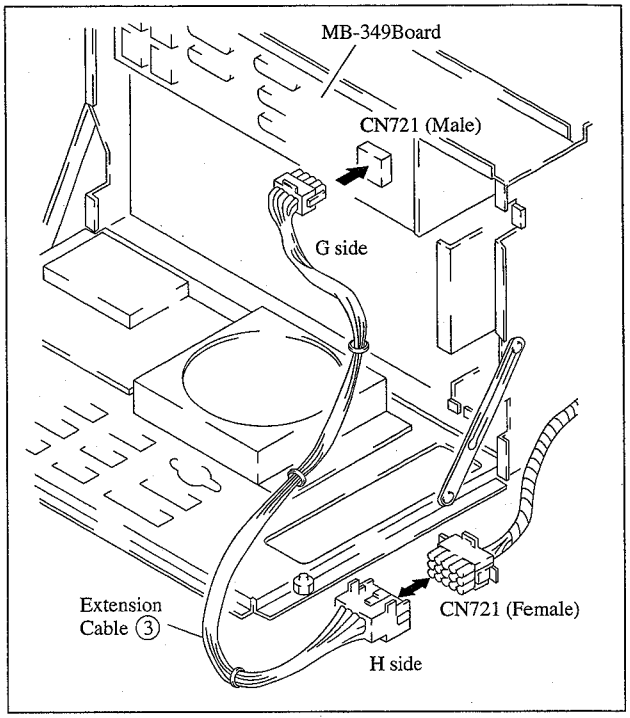
2-5-6. Extension Cable for the SW-REG Adjustment

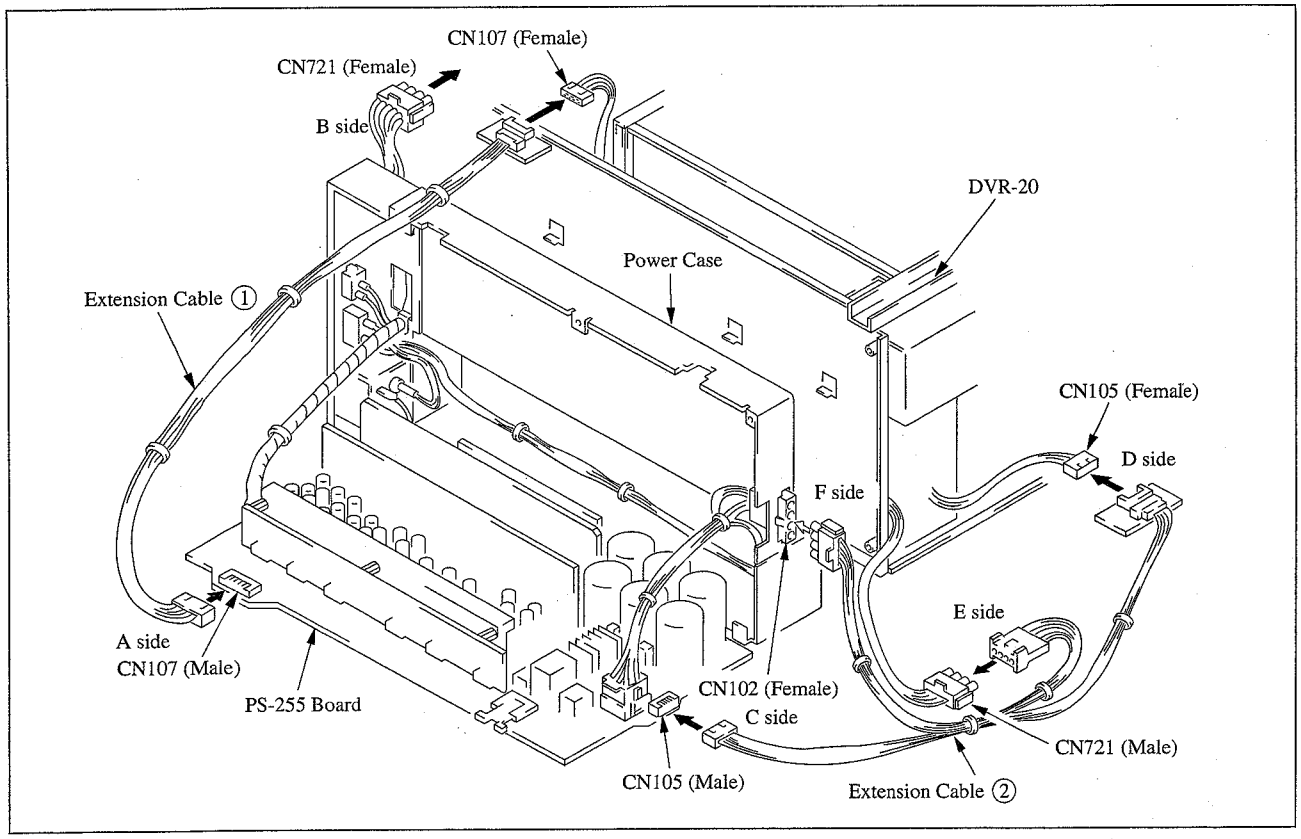
When checking or repairing the boards inside the power supply, an extension cable is required to supply power to the boards.
Before using the cable, see Section 2-5-1 "Primary Circuit & Electric Shock" and be careful of the electric shock hazard. When connecting these cables, turn the power off and pull out the power cord.

(1) Connect the A side of SW-REG adjustment extension cable ① to the connector CN107 (Male) on PS-255 board, and the B side of this cable to the connectors CN107 (Female).

(2) Connect the C side of SW-REG adjustment extension cable ② to the connector CN105 (Male) and the D side of this cable to the connector CN105 (Female). Then connect the E side of this cable to the connector CN102 (Male) and the F side of this cable to the connector CN102 (Female).

(3) Connect the G side of SW-REG adjustment extension cable ③ to the connector CN721 (Male) on MB-349 board and the H side of this cable to the connector CN721 (Female).

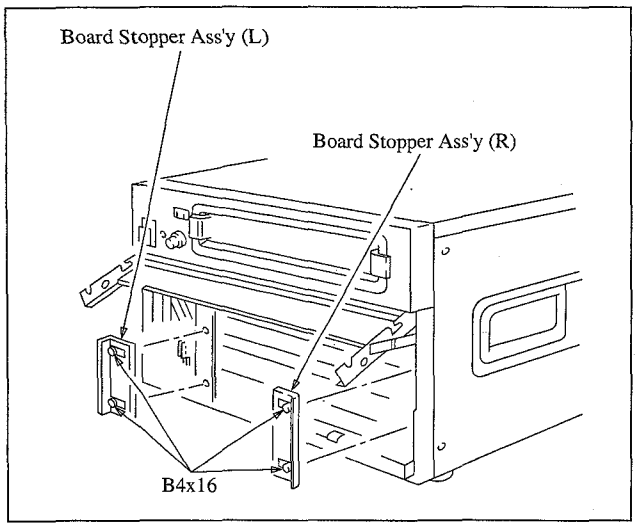




2-6. REMOVING/INSERTING PLUG-IN BOARDS

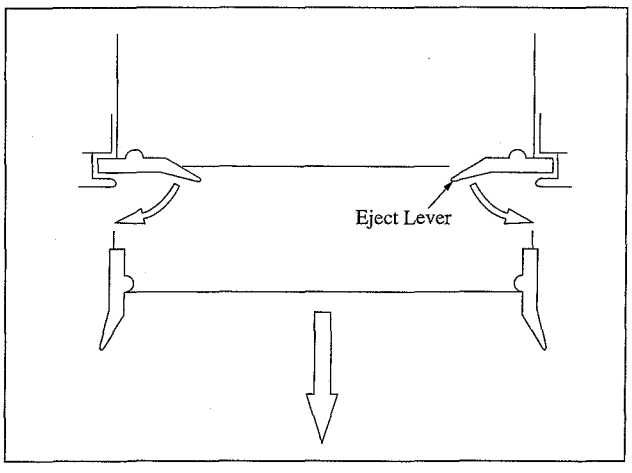
After turning the power OFF, remove or insert the plug-in board.

When removing the Card Rack-1 (Processor block), loosen the four screws (two on each side) as shown in the figure, and remove the board stopper ass'ys.



Removing the board

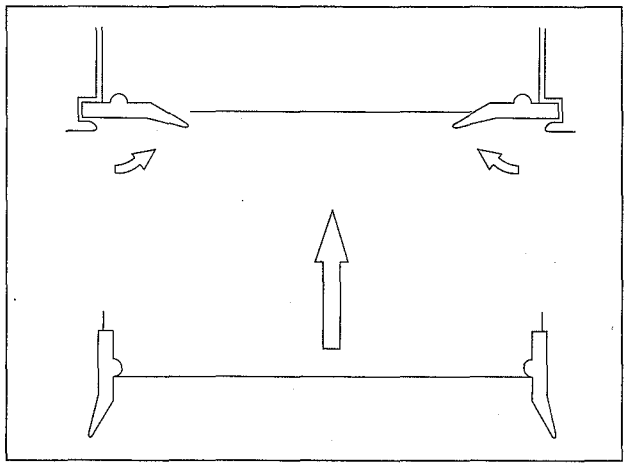
Pull up the eject levers on the board in the direction of the arrows when removing the board from the connector.
Do not try to pull the board by grasping any of the components on the board.



Inserting the board

Keep the eject levers in the pulled up position and slowly insert the board. After inserting the board in the grooves as shown in the figure, push down the eject levers and push the board in.

Note: Do not insert the board into the grooves with the eject levers pushed down.



2-7. NOTES ON REPAIR PARTS

2-7-1. Notes on Repair Parts

(1) Safety Related Components Warning

The ⚠ marked components on the schematic diagrams, exploded views and electrical spare parts list are critical to safety. Replace only with the same components as specified.

(2) Standardization of Parts

Replacement parts supplied from the Sony Parts Center will sometimes have a different shape and outside view from the parts which are used in the unit.
This is due to accommodating improved parts and/or engineering changes or standardization of genuine parts.
This manual's exploded views and electrical spare parts list indicate the part numbers of current standardized genuine parts.

(3) Stock of Parts

The parts marked with "s" in the SP (Supply Code) column of the exploded views and electrical spare parts list are normally stocked for replacement purposes.
The parts marked with "o" in the SP column are not normally required for routine service work. Orders for parts marked with "o" with be processed, but allow for additional time for delivery.

(4) Units for Capacitors, Inductors and Resistors

The following units are assumed in schematic diagrams, electrical parts list and exploded views unless otherwise specified.

Capacitors:	μF
Inductors :	μH
Resistors :	ohm

(5) Voltage Selector

Repair parts supplied from Sony Parts Center are set to 220-240V.
For details, refer to Section 2-5-2 "Notes on Voltage Selector."

(6) Change of Parts

Regarding engineering parts changes, refer to Section 22 "Changed Parts."

2-7-2. Replacement Procedure of Chip Parts

Required Tools:

Soldering iron: 20W
If possible, use a soldering-iron tip heat-controller set to 270±10°C.

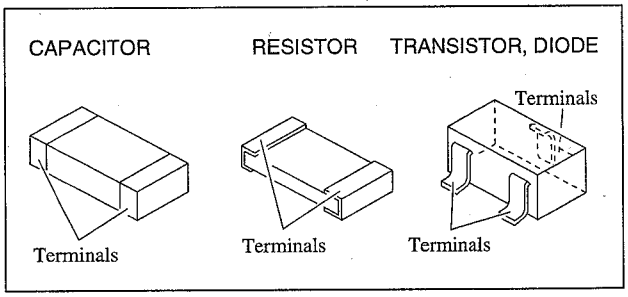
Braided wire (Desoldering metal braid):
SOLDER TAUL or equivalent
Sony part No. 7-641-300-81

Solder: 0.6 mm dia. is recommended.

Tweezers

Soldering Conditions:

Soldering iron temperature: 270±10°C
Soldering time: 2 seconds per pin



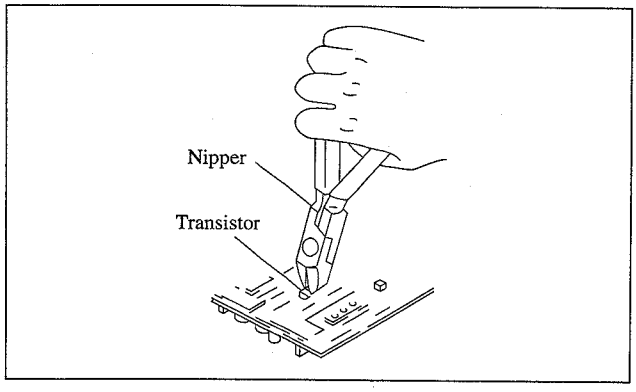
Replacement of Resistor and Capacitor

(1) Place the soldering-iron tip onto the chip part and heat it up until the solder is melted.
When the solder is melted, slide the chip part aside.
(2) Make sure that there is no pattern peeling, damage and/or bridge around the desoldering position.
(3) After removing the chip part, presolder the area, in which the new chip part is to be placed, with a thin layer of solder.
(4) Place new chip part in the desired position and solder both ends.

Note: Do not use a chip part again once it has been removed.

Replacement of Transistors and Diodes

(1) Cut the terminals of the chip part with nippers.
(2) Remove the cut leads as above.
(3) Make sure that there is no pattern peeling, damage and/or bridge around the desoldering positions.
(4) After removing the chip part, presolder the area, in which the new chip part is to be placed, with a thin layer of solder.
(5) Place new chip part in the desired position and solder the terminals.



Replacement of ICs

(1) Using the braided wire (desoldering metal braid), "SOLDER TAUL" Sony Part No. 7-641-300-81, remove the solder around the pins of the IC-chip to be removed.
(2) While heating up the pins, remove them one by one using sharp-pointed tweezers.
(3) Make sure that there is no pattern peeling, damage and/or bridge around t he desoldering position.
(4) After removing the chip part, presolder the area, in which the new chip part is to be placed, with a thin layer of solder.
(5) Place new chip part in the desired position and solder the pins.

2-7-3. Replacing Backup Battery

The following boards are provided with a RAM backup battery. When replacing a RAM back up battery, be sure to use the battery listed in the parts list.
The replacement procedures are described below:

DM-63 board

When the battery on DM-63 board runs down, no message will be displayed on the EL panel, hence it is necessary to replace this battery periodically. The standard replacement interval is 4 or 5 years after you purchased the VTR.
Replace the battery using the following procedures:

(1) Turn the power ON, and after three minutes turn it OFF again and then remove the board.
(2) When replacing the battery, take care not to touch any conductive parts other than the battery.
Even after the battery has been removed, the data will be retained for several days, however the battery should be replaced with a new one as quickly as possible.

Note: Unless the above procedures are followed, all of the RAM data will be lost.

SP-15 Board

A NOVRAM which has a built-in battery, is mounted on SP-15 board.
The standard replacement interval is about ten years.
Replace the battery using the following procedures:

(1) Turn the power ON, and remove the board.
(2) Remove IC733 (address B20) from the IC socket and replace it with new one.
It is not necessary to initialize the NOVRAM.

SY-165 Board

A NOVRAM which has a built-in battery, is mounted on SY-165 board.
The standard replacement interval is about ten years.
Replace the battery using the following procedures:

(1) Turn the power ON, and remove the board.
(2) Remove IC25 (address A10) from the IC socket and replace it with new one.
(3) After replacement, install SY-165 board and turn the power ON pressing S1 (SET UP switch).
Press S1 continuously, until LED D2 blinks.
(4) Remake the entry of SET UP USER SETTING 1 to 3 (F1 to F3).

When the NOVRAM on SY-165 board is replaced, the USER SETTING DATA is lost.
For details about the initialization of NOVRAM, please consult the service personnel.

CP-174/178 Boards

Refer to the Maintenance Manual of BKDV-201/200.

CP-120 Board

Refer to the Maintenance Manual of BKDV-101.

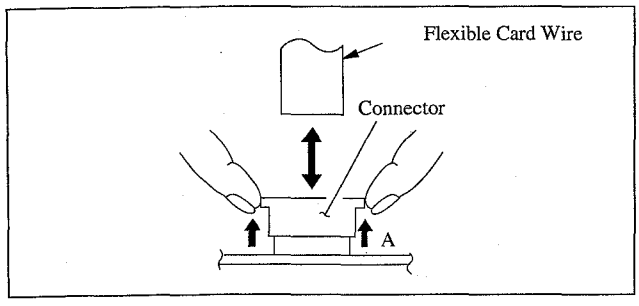
2-7-4. Replacing Flexible Card Wire (4P, 6P, 32P)

4P cable is used in the cassette-up compartment, 6P cable is used on DET-19 board and 32P cable is used in the reel motor.
When handling the cable, be very careful not to bend it because it will markedly reduce its life.

Disconnecting the cable

(1) Pull portion A of the connector to the cable side, as shown in the figure.
Note: Under no circumstances pull the cable first.

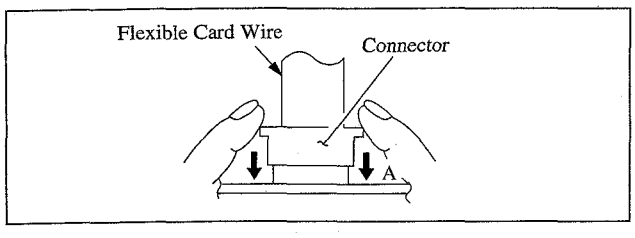
(2) Disconnect the cable.



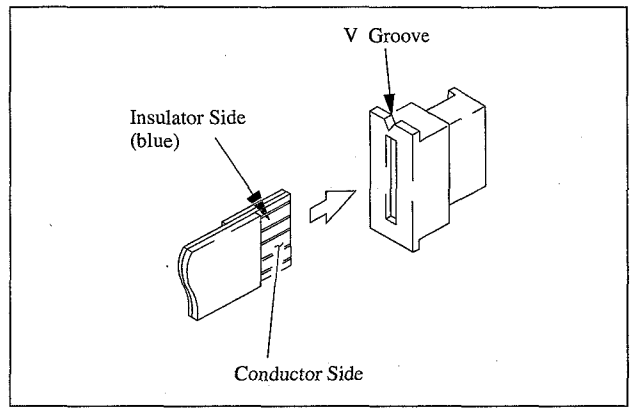
Connecting the cable

(1) Identify the front and back faces of the cable, then insert the cable into the connector.

(2) Insert portion A of the connector.



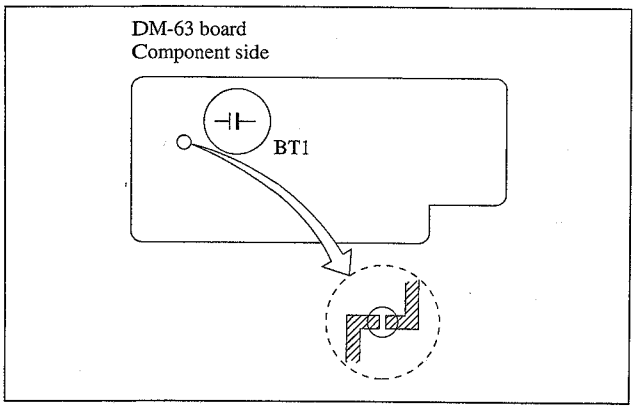
Note: The flexible card wire consists of conductor side and insulator side.
After checking the direction of conductor side and insulator side as shown in the figure, connect the flexible card wire into the V groove.
No operation will result if the cable is inserted wrongly.



2-8. NOTES ON REPLACING BOARDS

Replacement of DM-63 Board

(1) The Backup Battery Pattern Slit Short
Short the soldering jumper on the component side on DM-63 board.
Check that the voltage between the shorted portion and the GND on the board is 3.1+0.3 Vdc/–0.1 Vdc.



(2) NOVRAM Data Transfer

A NOVRAM and maintenance timers are mounted on DM-63 board. This NOVRAM can be read/written about 10,000 times. When DM-63 board is replaced, all the timers for the following total time/number are reset.
*The total time that the power of the unit has been turned ON
*The total rotation time of the head drum
*The total running time of the tape
*The total number of threading/unthreading operations

It is necessary to transfer the NOVRAM data from the board that was replaced.
For details, please consult the service personnel.

Replacement of SP-15 Board

A NOVRAM which has a built-in battery, is mounted on SP-15 board. This NOVRAM's life is about 10 years.
When replacing SP-15 board, it is not necessary to initialize the NOVRAM.

Replacement of SY-165 Board

Initialization of NOVRAM
A NOVRAM which has a built-in battery, is mounted on SY-165 board. This NOVRAM's life is about 10 years.
When replacing SY-165 board, it is necessary to initialize NOVRAM.
For details, please consult the service personnel.

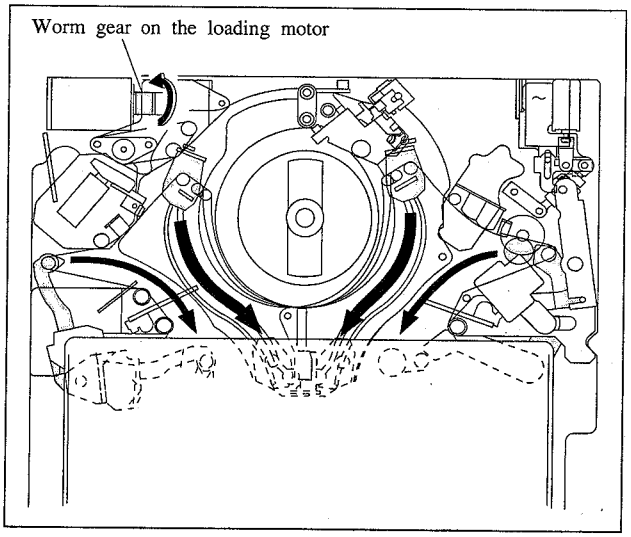
2-9. HOW TO REMOVE A CASSETTE WHEN THE TAPE IS SLACK

If either the cassette cannot be ejected or the cassette compartment does not rise up due to some trouble or other, switch off and first carry out the following procedures to remove the cassette tape.

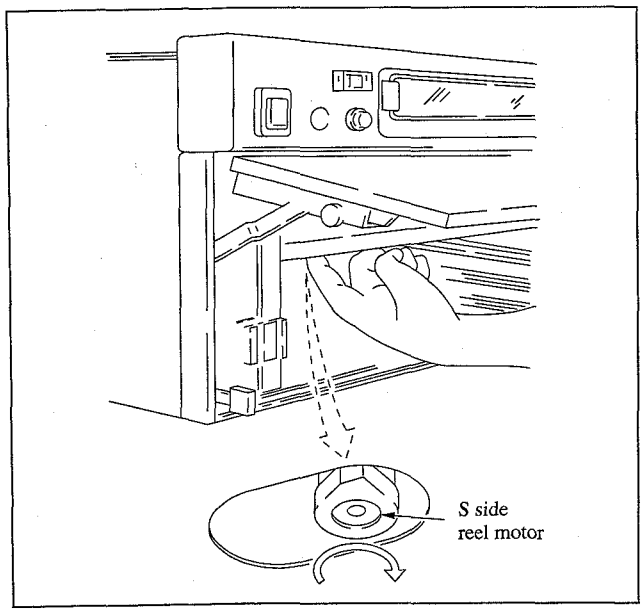
(1) Remove the top panels and open the control panel or the blank panel.

(2) Pull out four processor boards (AD-73, DE-37/36, PR-157 and EN-99 boards) from the unit.

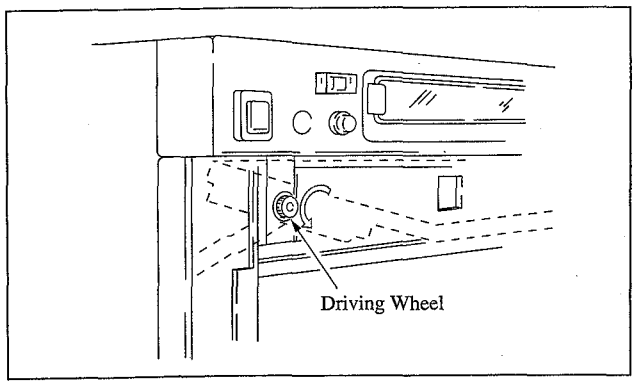
(3) Rotate the worm gear on the loading motor by hand in the direction of the arrow and move each guide to the unthreading position (as shown by doted line). The tape will remain at the threading position.



(4) Place hand inside the opening at the bottom of the cassette loading port, and rotate the bottom of S side reel motor by hand to take up the tape protruding from the cassette.
At this time, take care not to damage the tape which remains in the unit.



(5) Leaving the cassette compartment installed on the VTR, rotate the driving wheel at the left front to the left side to raise the cassette compartment.



(6) Take out the cassette tape from the cassette compartment.

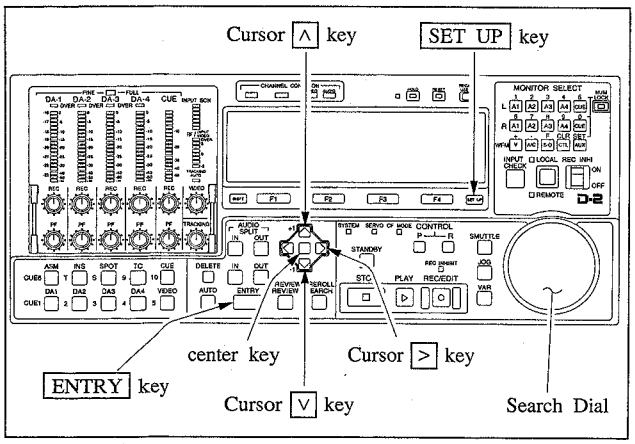
(7) Check the cause of the trouble and carry out repair.

2-10. CLEANING PROCEDURES FOR HEAD CLOGGING

The cleaning roller mounted on the drum block avoids the head lightly clogging. The cleaning roller usually contacts the rotary head automatically at regular intervals, and performs cleaning. This section describes the cleaning procedures when the usual cleaning does not function successfully.

Cleaning Procedures

BKDV-200/201



(1) Press the following keys on the control panel.
① Press the SET UP key.
② Press the ENTRY key + center key and turn the search dial to select No. 817 (RF ENVELOPE). (Fig. 1)

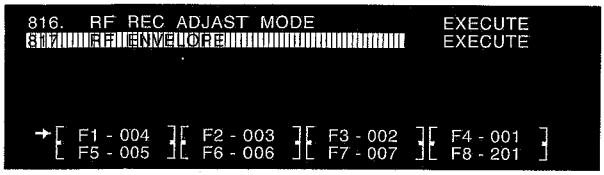


Fig. 1

③ Press the cursor > key to light up the EXECUTE part.

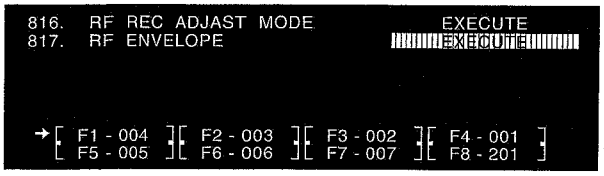


Fig. 2

④ Press the cursor ∧ or ∨ key to excute the menu. The following display (Fig. 3) is shown.

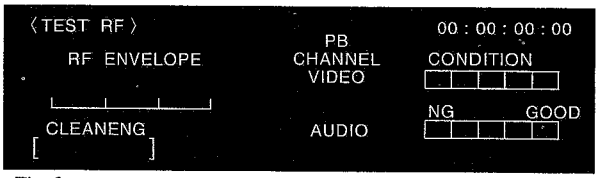


Fig. 3

(2) ① When pressing the F1 (CLEANING) key, the cleaning roller cleans the video head repeatedly. When the video head is clogged, NG is displayed on [PB CHANNEL CONDITION] on the display as shown in Fig. 4 (a).
② When, while pressing the F1 (CLEANING) key, the head clog is removed, GOOD is displayed on [PB CHANNEL CONDITION] on the display as shown in Fig. 4 (b).

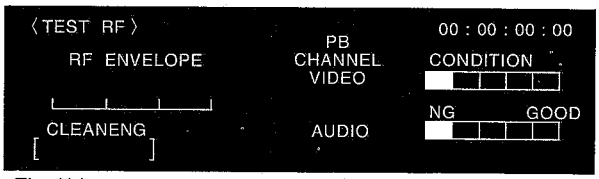


Fig. 4(a)

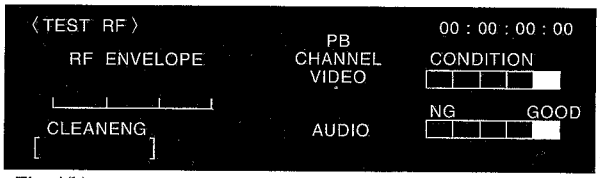


Fig. 4(b)

③ After that, press the SET UP key to retrun the HOME menu.

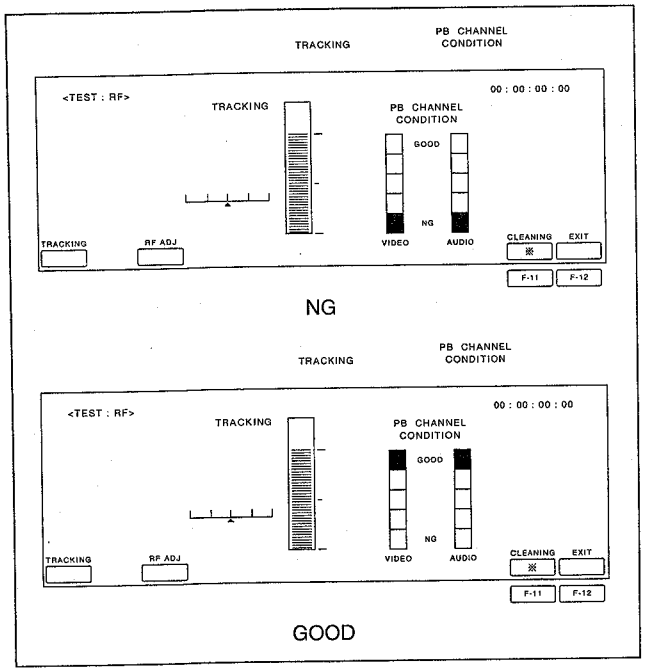
(3) If, after one minute with F1 pressed, the indication does not return to GOOD, use the cleaning tape or the cleaning piece moistened with alcohol and perform cleaning.

Cleaning Procedures

BKDV-101

(1) Press the TEST key on the Menu select keys and then press the F5 (RF) key on the function control panel.

(2) When pressing the F11 (CLEANING) key, the cleaning roller cleans the video head repeatedly. When the video head is clogged, NG is displayed on [REC & PB CHANNEL CONDITION] on the control panel.
When, while pressing the F11 (CLEANING) key, the head clog is removed, GOOD is displayed on [REC & PB CHANNEL CONDITION] on the control panel.



* When the cleaning roller is ON, the CLEANING lights are ON.

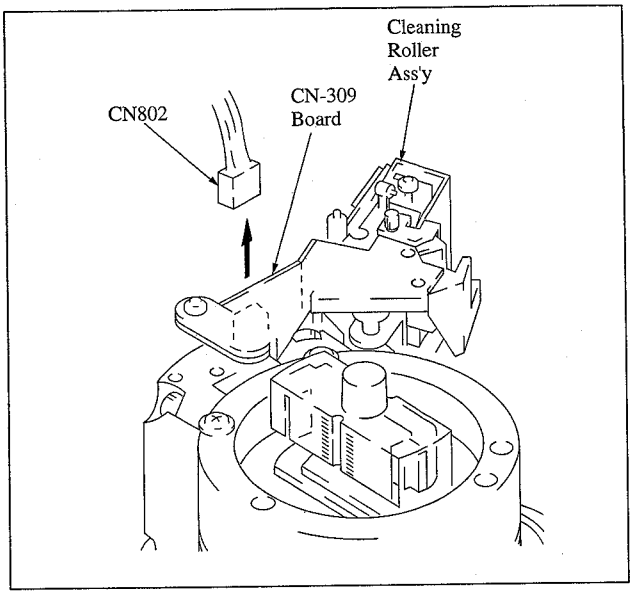
(3) If, after one minute with F11 pressed, the indication does not return to GOOD, use the cleaning tape or the cleaning piece moistened with alcohol and perform cleaning.

Disabling the operation of the cleaning roller

The operation of the cleaning roller can be disabled for checking and adjusting, perform as follows.

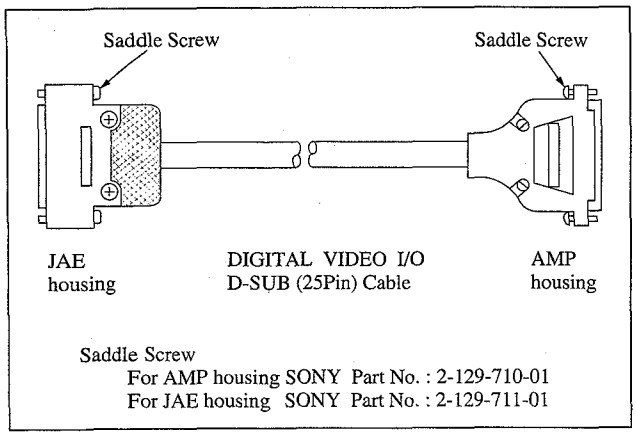
(1) Remove the top panel.

(2) Disconnect the connector CN802 on CN-309 board mounted on the cleaning roller ass'y.

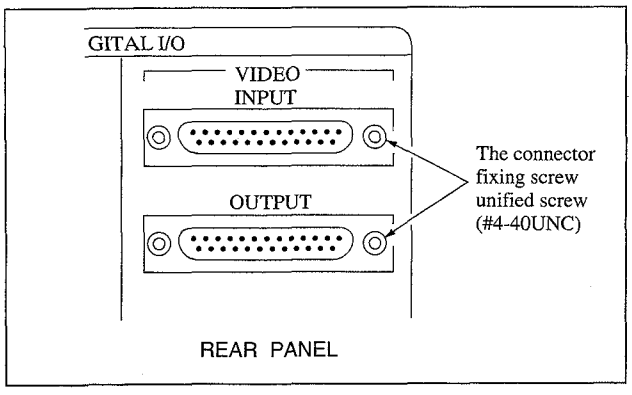


2-11. CONNECTING THE CABLE TO THE DIGITAL VIDEO IN/OUT CONNECTORS

The connector fixing screw of the digital video IN/OUT connector which is used in the unit has been standardized as an unified screw (#4-40UNC) by SMPTE.EBU.
There are a few cases that an ISO standard 2.5mm screw instead of an unified screw as a saddle screw (screw for fixing the cable) is used.
Check that unified screw is used as a saddle screw when fixing the VCD cable with the screws. If necessary, replace an ISO standard 2.5mm screw with an unified screw.



Saddle Screw
For AMP housing SONY Part No. : 2-129-710-01
For JAE housing SONY Part No. : 2-129-711-01



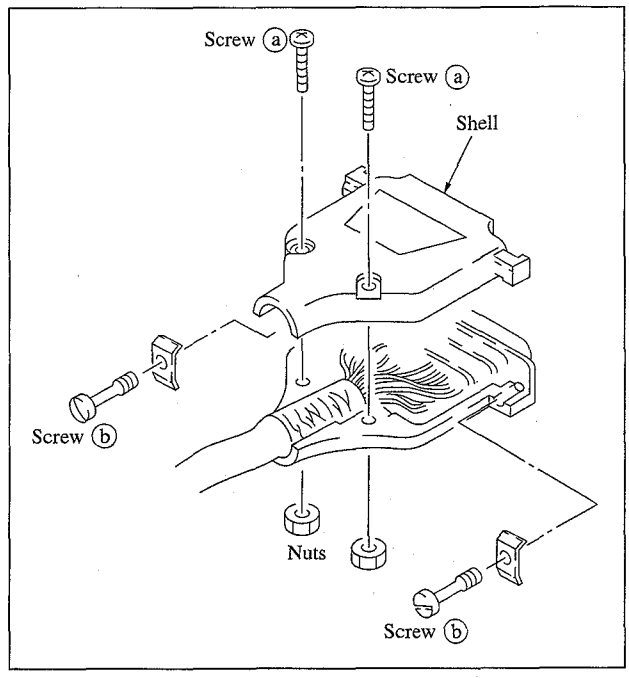
How to Replace a Saddle Screw
(ISO standard 2.5mm screw→ unified screw)

(1) Remove the two screws ⓐ , open the shell of housing.

(2) Replace the two screws ⓑ with the unified screws (#4-40UNC) supplied with the VCD cable.

Note: When the unified screws are not supplied with the VCD cable, please contact your nearest Sony service facility.

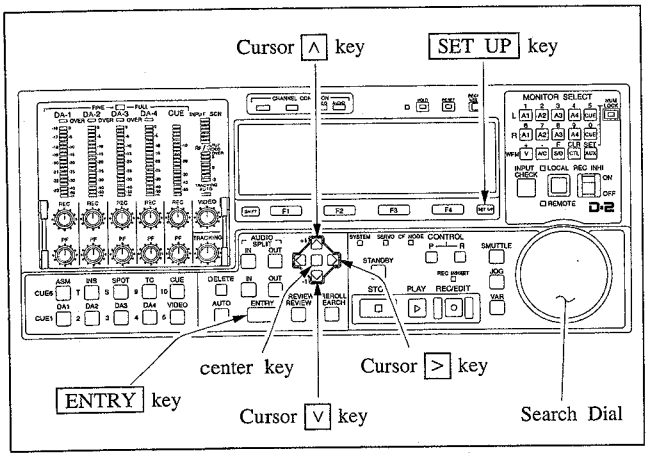
(3) When shutting the shell, ensure that the screws ⓐ and nuts do not catch the wire leads.



2-12. SETTING THE USER SET VALUE FOR SYNC PHASE AND SC PHASE

For BKDV-201/200

The settings for SYNC and SC phase can be stored in the NOVRAM by the following procedure.



(1) "SET UP: VIDEO IN/OUT No.211 and No.212" is displayed.

Procedure:

① Press the SET UP key on the control panel.

② Select No.211 (SYNC PHASE) or No.212 (SC PHASE) by search dial or ∧ ∨ keys. (Fig. 1)

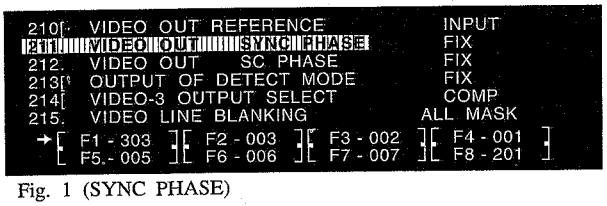


Fig. 1 (SYNC PHASE)

(2) Adjust the SYNC or SC phase value.

Procedure:

① Press the cursor > key so as to be able to change the data. (Fig. 2)

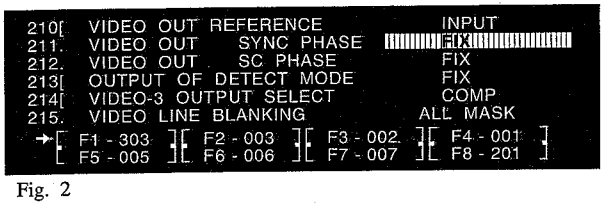


Fig. 2

② The part shown in the following figure is usually "FIX." If this setting is changed, press the center key to change the display shown in the Fig. 3

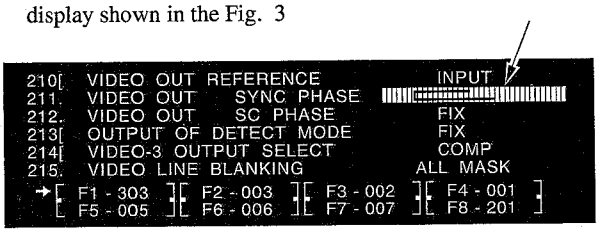


Fig. 3

③ Turn the search dial to adjust the suitable phase. (Fig. 4)

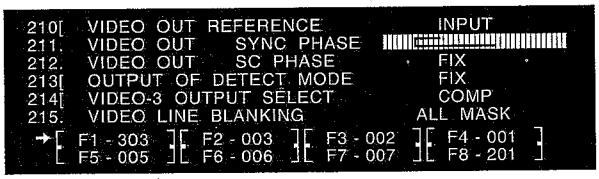


Fig. 4

④ Press the ENTRY key + center key. The setting is memorized.

(3) Write the setting as fixed values to NOVRAM.

Procedure

① Press the ENTRY key + center key and turn the search dial to select the TEST menu.

② Turn the search dial to select the checker mode. (Fig. 5)

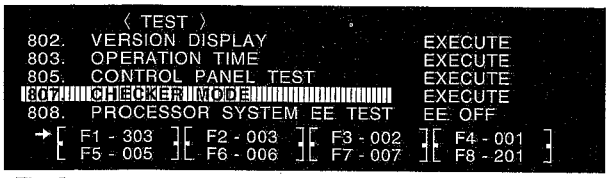


Fig. 5

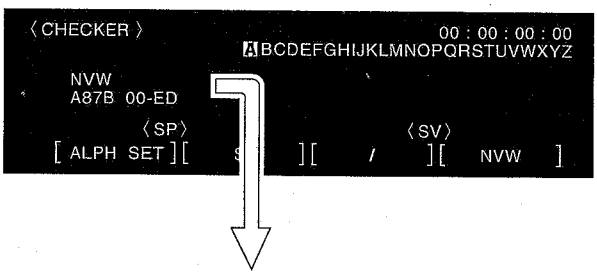
③ Press the cursor > key so as to be able to change the data. (Fig. 6)

Fig. 6

④ Press the cursor ^ key to execute. (Fig. 7)

Fig. 7

(4) Whenever the F3 (/) key is pressed, the following addresses are displayed. (Fig. 8)



	DISPLAY			OPERATION
	CHECK	DATA	NEW DATA	
SYNC	A87B	□□ —	□□	/
	A87C	□□ —	□□	/
SC	A87D	□□ —	□□	/
	A87E	□□ —	□□	/
CHECK	A8FE	□□ —	□□	/
SUM	A8FF	□□ —	□□	/
PUSH NVWR SW:		Press S71 (NOVRAM WRITE switch) on SSP-07 board.		
READY:		Perform (5), procedure 1 or 2.		

Fig. 8

When setting the SYNC phase, A87B and A87C addresses are displayed.
When setting the SC phase, A87D and A87E addresses are displayed.
A8FE and A8FF addresses are CHECK SUM.
If addresses other than the above are displayed, turn the power off and perfom (1) through (3) again.

(5) Press the F3 (/) key after checking the addresses on the control panel,"PUSH NVWR SW" is displayed.
Press S71 (NOVRAM WRITE switch) on SSP-07 board. Check that "READY" is appeared on the control panel. (Fig. 9)
Perform either procedure 1 ot 2 below.

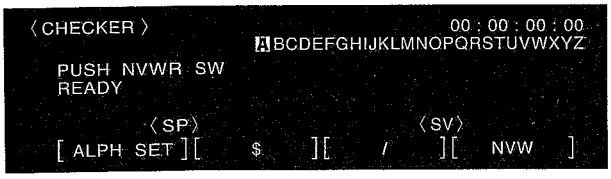
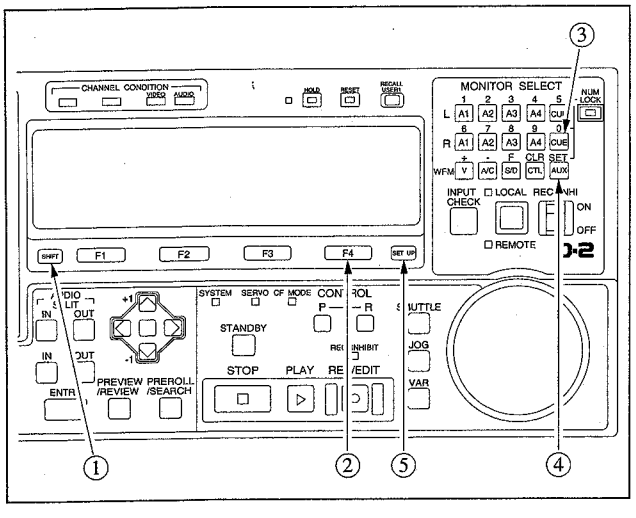


Fig. 9

Procedure 1
Tum the power off after checking.
The setting is performed after repowering.

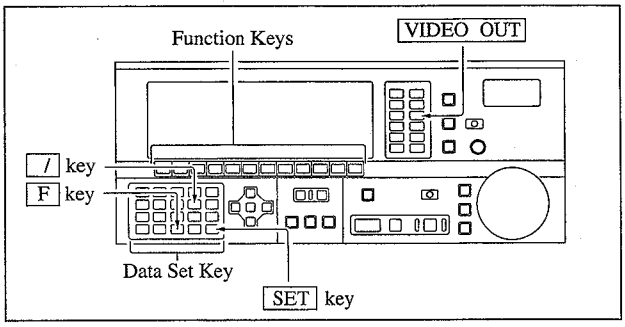
Procedure 2
① Press the SHIFT key of the function key.
② Press the F4 (=) key.
③ Press the MONITOR SELECT key, CUE (0) key of R.
④ Press the MONITOR SELECT key, AUX (SET) key of WFM.
⑤ Press the SET UP key of the function key to return the HOME menu display.



(6) Perfom (1) again and check the settings.
Check that the indication becomes "FIX" with the cursor key.
Even if the SYNC or SC phase is changed when VAR mode is selected, the pre-set values are restored by pressing the center key.

For BKDV-101

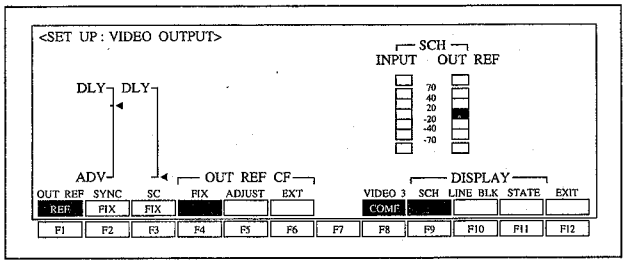
The settings for SYNC and SC phase can be stored in the NOVRAM by the following procedure.



(1) "SET UP: VIDEO OUTPUT" is displayed.

Procedure
Press the keys on the control panel in the following sequence

VIDEO OUT, F12 (SET UP), F9 (SCH)



(2) Adjust the SYNC or SC phase value.

Setting of the SYNC phase value

Press the F2 (SYNC) key and then adjust the phase with the level control. After adjusting, press the F2 (SYNC) key while pressing the F key on the data set key.

Setting of the SC phase value

Press the F3 (SC) key, and then adjust the phase with the level control. After adjusting, press the F3 (SC) key while pressing the F key on the data set key.

(3) Write these settings as fixed values to NOVRAM.

Procedure
Press the keys on the control panel in the following sequence.

TEST, F6 (CHECKER), F1 (SP), F10 (NVW), SET

(4) Whenever the [/] key is pressed, the following addresses are displayed.

	DISPLAY			OPERATION
	CHECK	DATA	NEW DATA	
SYNC	A87B	□□ —	□□	[/]
	A87C	□□ —	□□	[/]
SC	A87D	□□ —	□□	[/]
	A87E	□□ —	□□	[/]
CHECK	A8FE	□□ —	□□	[/]
SUM	A8FF	□□ —	□□	[/]
PUSH NVWR SW:		Press S71 (NOVRAM WRITE switch) on SP-15 board.		
READY:		Perform (5), procedure 1 or 2.		

When setting the SYNC phase, A87B and A87C addresses are displayed.
When setting the SC phase, A87D and A87E addresses are displayed.
A8FE and A8FF addresses are CHECK SUM.
If addresses other than the above are displayed, turn the power off and perform (1) through (3) again.

(5) Press the [/] key after checking the addresses on the control panel, "PUSH NVWR SW" is displayed.
Press S71 (NOVRAM WRITE switch) on SP-15 board.
Check that "READY" is appeared on the control panel.
Perform either procedure 1 or 2 below.

Procedure 1
Turn the power off after checking.
The setting is performed after repowering.

Procedure 2
Press the keys in the following sequence.

[=], [0], [SET]

(6) Perform (1) again and check the settings.
Check that the indication of [F2] (SYNC PHASE) and [F3] (SC PHASE) is "FIX".
Even if the SYNC or SC phase is changed when VAR mode is selected, the pre-set values are restored by changing the UNITY/VAR selection to UNITY.

2-13. BKDV-205/206

BKDV-205/206 SONY SERIAL INTERFACE BOARD

This optional board can send and receive digital video signal and the four channels of digital audio using one BNC cable.
For details, refer to the BKDV-205/206 Installation and Maintenance Manual.

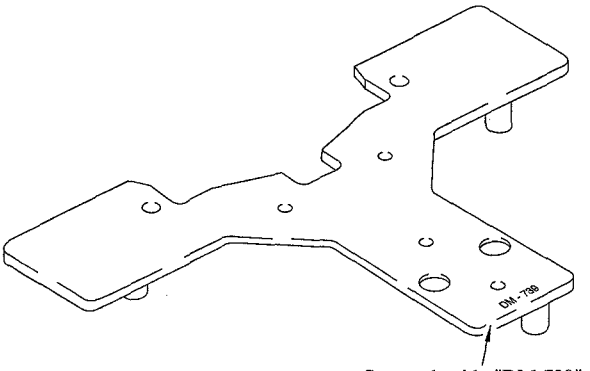
SECTION 4
TOOLS AND MEASURING INSTRUMENTS

4-1. TOOLS

The necessary tools for inspection and part replacement of D-2 Series VTR are shown below.

Reference Plate
SONY Part No. J-6257-390-A
For DVR-28/DVR-28P

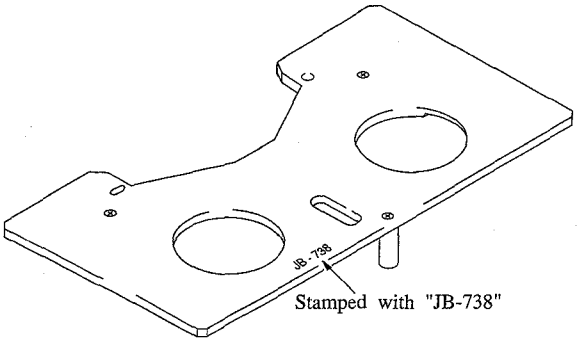
This is used for the height adjustment of the reel table.



Stamped with "DM-739"

Reference Plate
SONY Part No. J-6257-380-A
For DVR-20/DVR-C20/DVR-20P/DVR-C20P

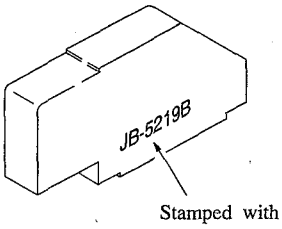
This is used for the height adjustment of the reel table.



Stamped with "JB-738"

Reel Table Height Adjustment Tool
SONY Part No. J-6252-190-B
For D2 series (except for Portable type)

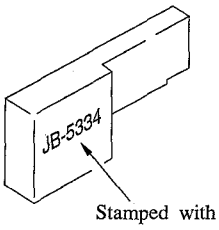
This is used for the reel table and the S5, T4 andT6 guides height adjustments (as for DVR-28/28P, the S6 and T6 guides).



Stamped with "JB-5219B"

Master Block (S3)
SONY Part No. J-6253-340-A
For DVR-10/DVR-C10/DVR-10P/DVR-C10P/
DVR-20/DVR-C20/DVR-20P/DVR-C20P/
DVR-18/DVR-18P/DVR-28/DVR-28P

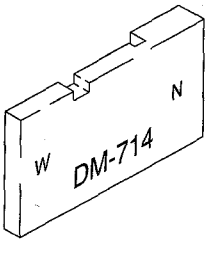
This is used for the S3 guide height adjustment.



Stamped with "JB-5334"

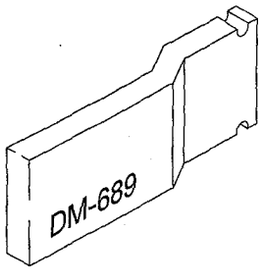
Confidence Head Adjustment Plate
SONY Part No. J-6257-140-A
For D2 series (except for Portable type)

This is used for the CONFIDENCE head projection adjustment.



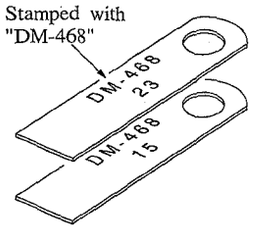
Tape Cleaner Adjustment Plate
SONY Part No. J-6256-890-A
For DVR-20/DVR-28

This is used for the tape cleaner projection adjustment.



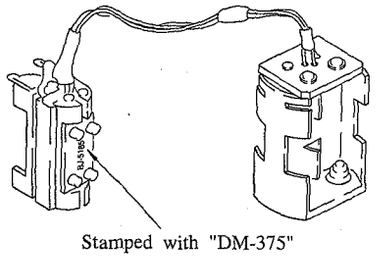
Slider Position Confirm Spacer
SONY Part No. J-6254-680-A
For D2 series (except for Portable type)

This is used for the clearance check between the slider rail and the S/T slider block.



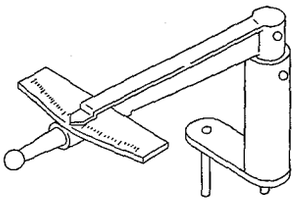
Pinch Roller Check Tool
SONY Part No. J-6253-750-A
For D2 series (except for Portable type)

This is used for the pinch roller pressure plate azimuth check. Use for UM3 batteries for this tool.



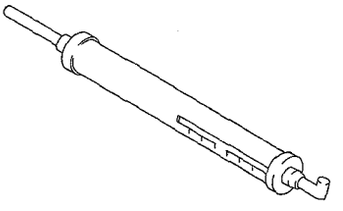
Pinch Roller Adjustment Tool
SONY Part No. J-6251-210-A
For D2 series (except for Portable type)

This is used for the pinch roller pressure measurement.



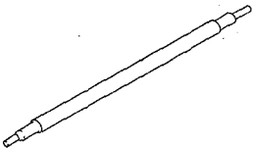
Tension Scale, 5kg
SONY Part No. J-6041-640-A
For DVR-28/DVR-28P/DVR-18/DVR-18P

This is used for the tension adjustment of the timing belt for the reel shift.



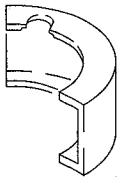
Rec Current Adjustment Cable
SONY Part No. 1-940-823-11
For D2 series (except for Portable type)

This is used for the REC current adjustment of the rotary heads.

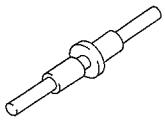


Upper Drum Attachment Tool
SONY Part No. J-6257-400-A
For DVR-20/DVR-28

This is used for the rotary head protection when replacing the inner dram



Upper Drum Spacer
SONY Part No. J-6257-400-1

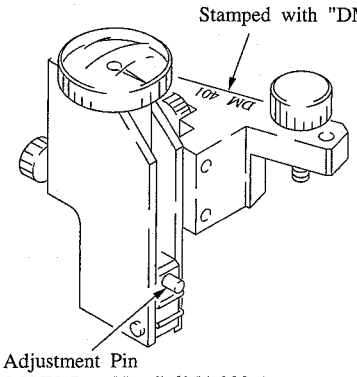


Disc Stopper Pin
SONY Part No. J-6257-400-2

Cap
SONY Part No. J-6257-400-3

Inner Drum Eccentricity Adjustment Tool
SONY Part No. J-6254-010-A
For DVR-10P/DVR-18P/DVR-20/DVR-28

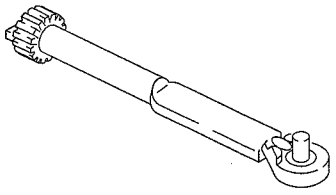
This is used for the head projection and the inner drum eccentricity adjustment.



Adjustment Pin
SONY Part No. J-6254-900-A

Ratchet Wrench (Across Flat: 3 mm)
SONY Part No. J-6254-660-A
For DVR-10P/DVR-18P/DVR-20/DVR-28

This is used to limit the tightening torque of the upper drum fixing screws when replacing the inner drum.

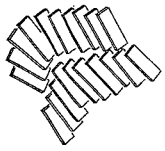


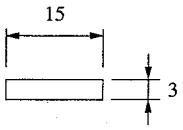
Upper Drum Hexagonal Driver (Across Flat: 3mm)
SONY Part No. J-6254-700-A
For DVR-10P/DVR-18P/DVR-20/DVR-28

This is used for removing and installing the upper drum fixing screws when replacing the inner drum.

Upper Drum Position Confirm Spacer (T=3μm)
SONY Part No. J-6254-690-A
For DVR-10P/DVR-18P/DVR-20/DVR-28

This is used for the clearance check after replacing the upper drum. (1 package has 20 pieces.)

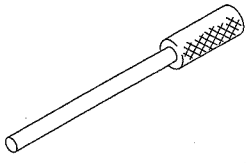




UNIT : mm

RG Set Pin
SONY Part No. J-6254-650-A
For D2 series (except for Portable type)

- This is used for potentiometer position adjustment.
- This is used for phase adjustment when replaced loading gear ass'y.



Hexagon Wrench Driver

1.5mm SONY Part No. 7-700-766-02
or SONY Part No. J-6153-970-A

2mm SONY Part No. 7-700-766-03

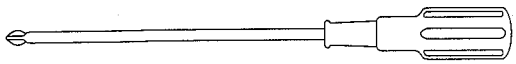
2.5mm SONY Part No. 7-700-766-04

D = 1.5, 2.0 or 2.5 mm

Phillips Screwdriver (4x240)

SONY Part No. 7-721-052-04
For DVR-10/DVR-10P/DVR-20

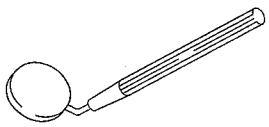
This is used for the cassette compartment position adjustment.



Dental Mirror

SONY Part No. 7-723-902-00
For D2 series (except for Portable type)

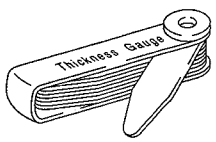
This is used for the tape running check.



Thickness Gauge

SONY Part No. J-6041-670-A
For D2 series (except for Portable type)

This is used for the position and clearance adjustments of mechanical parts.



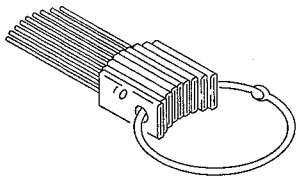
Thickness (mm)

0.03	0.04	0.08
0.09	0.10	0.11
0.12	0.13	0.14
0.15	0.20	0.25
0.30	0.35	0.40
0.45	0.50	0.60
0.75	0.80	0.90
1.00		

Wire Clearance Gauge Set

SONY Part No. J-6152-450-A
For D2 series (except for Portable type)

This is used for the gear block clearance adjustment.

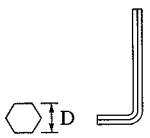


Thickness (mm)

0.1	0.2
0.3	0.4
0.5	0.6
0.7	0.8
0.9	1.0

L-Shaped Hexagonal Wrench Set

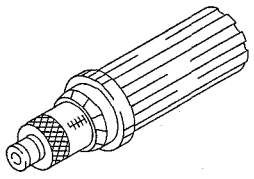
SONY Part No. J-6041-700-C
or 7-700-735-00
For D2 series



D (mm)	7-700-736-00	J-6041-700-C
1,27	○	○
1,4	○	
1,5	○	○
1,58	○	
2,0	○	○
2,5	○	○
3,0	○	○
4,0	○	○
5,0	○	○
6,0	○	
8,0	○	
10	○	
Ball Point 1,5		○
Ball Point 2,0		○
Ball Point 2,5		○

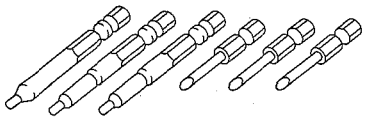
Torque-Screwdriver

6kg-cm SONY Part No. J-5252-510-A
12kg-cm SONY Part No. J-6252-520-A
26kg-cm SONY Part No. J-6252-530-A



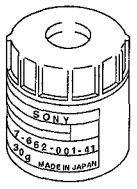
Bits Set of Torque-Screwdriver

SONY Part No. J-6252-540-A



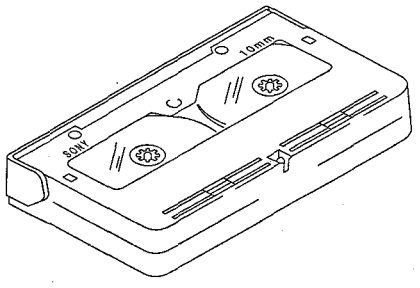
Molyton Grease No.320 (30g Bottle)

SONY Part No. 7-762-001-41



Cleaning Cassette, DCS-12CL or DCM-12CL

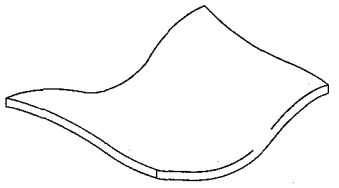
Standard Products



Cleaning Piece

SONY Part No. 2-034-697-00

This is used for cleaning darum ass'y and stationary head.

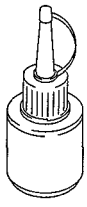


Oil

SONY Part No. 7-661-018-18

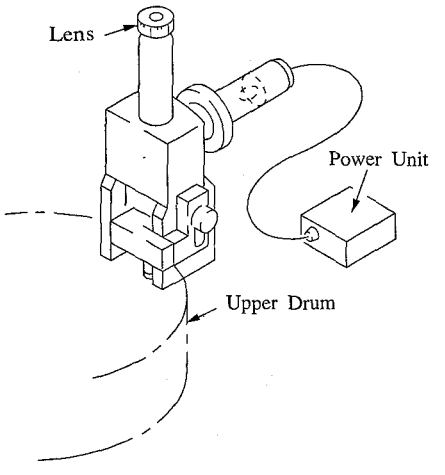
Cleaning Liquid

SONY Part No. 9-919-573-00



Head Chip Microscope
SONY Part No. J-6252-210-A

This is used for observing the surface of the video heads. Refer to the instruction sheet supplied to the microscope.



S Tension Regulator Adjustment Tool
SONY Part No. J-6257-350-A

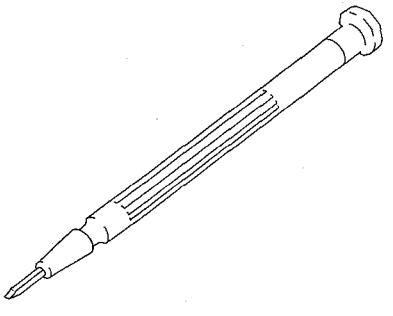
This is used for the S tention regulator arm tention adjustment.

T Tension Regulator Adjustment Tool
SONY Part No. J-6257-360-A

This is used for the T tention regulator arm tention adjustment.

Adjustment Driber 1.3mm(ceramic)
SONY Part No. 7-721-052-81

This is used for adjustment of the variable resistor.

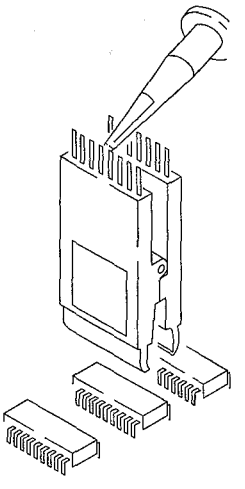


IC Test Clip
Type TC-16: SONY Part No. J-6041-770-A
Type TC-20: SONY Part No. J-6041-780-A

Manufactured by: AP PRODUCTS INCORPORATED

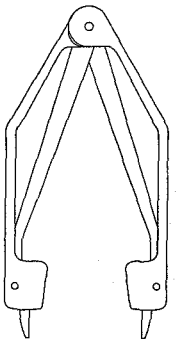
P.O. Box 697, 72 Corwin Drive,
Painesville, Ohio 44077, U.S.A.
Phone: (216) 354-2101

When connecting the test probe to the terminal of DIP integrated circuit for check or adjustment, these clips are convenient. Type TC-16 is used for DIP 14-pin or 16-pin IC and Type TC-20 for 18-pin or 20-pin IC.



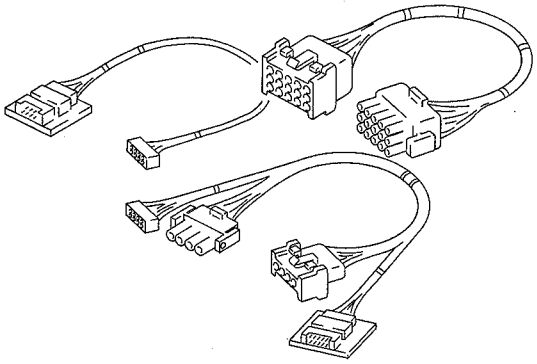
PLCC IC Extraction Tool
SONY Part No. J-6035-070-A

This tool is useful for extracking PLCC type ICs and fits ICs with 20 through 124 pins.



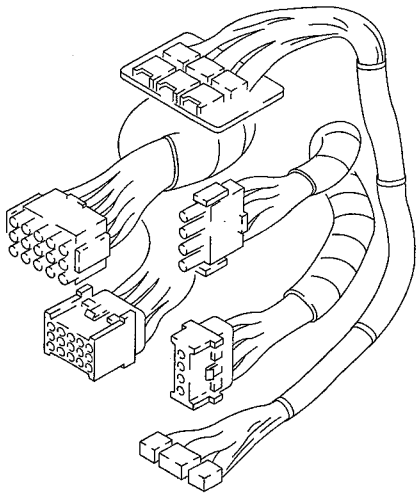
SW-REG Adjustment Extension Cable
SONY Part No. J-6264-690-A
For DVR-20/DVR-C20/DVR-20P/DVR-C20P/
DVR-10/DVR-C10/DVR-10P/DVR-C10P

This is used for the power supply adjustment.



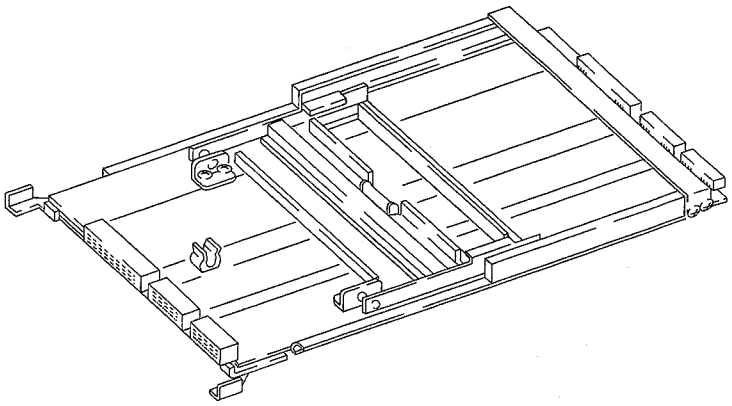
SW-REG Adjustment Extension Cable
SONY Part No. J-6266-460-A
For DVR-28/DVR-28P/DVR-18/DVR-18P

This is used for the power supply adjustment.



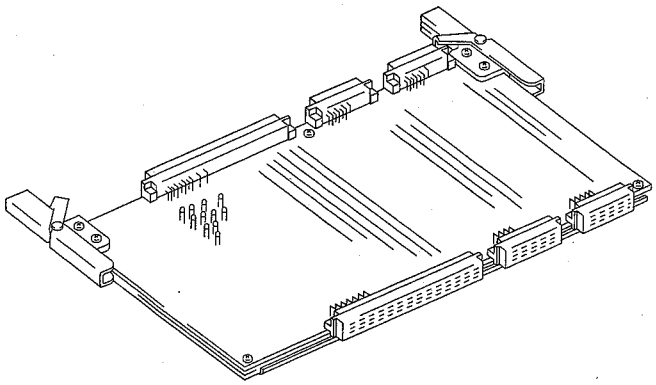
Extension Board, EX-341
SONY Part No. A-6001-038-A

This is used for checking and repairing the plug-in boards that are installed in the processor block.(One board is provided.)



Extension Board, EX-185
SONY Part No. A-6001-015-A

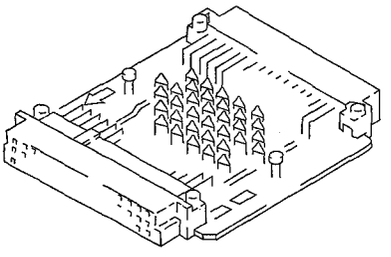
This is used for checking and repairing the plug-in boards that are installed in the card rack block.(One board is provided.)



Extension Board, EX-241

SONY Part No. A-6025-144-A

This is used for checking and repairing the REC-11 board.(One board is provided.)



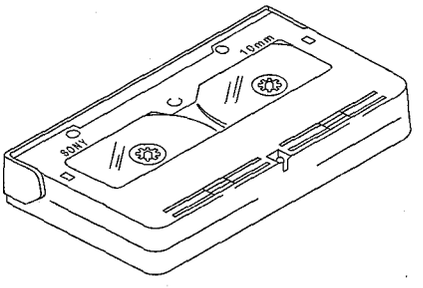
Alignment Tape

NTSC

ER2-2NTSC Mechanical Adjustment
SONY Part No. 8-960-071-12
ER5-2NTSC Electrical Adjustment
SONY Part No. 8-960-071-02

PAL

ER2-2PAL Mechanical Adjustment
SONY Part No. 8-960-071-62
ER5-2PAL Electrical Ajustment
SONY Part No. 8-960-071-52



4-2. MEASURING INSTRUMENTS

Oscilloscope
NTSC
PAL
Equivalent product: 2445 or 2465/Tektronix
Band width: more than 150MHz

Digital Voltmeter
Equivalent product: 3435A/Hewlett Packard
Effective digits: more than 5 digits
Acculacy: 0.02% ± 1count

DC Current Meter
Range: 10A

Analog Test Signal Generator
NTSC
Equivalent product: (1) 1410/Tektronix and the following plug-in units
SPG2 SYNC generator
TSG1 Color bar generator
TSG3 Linearity generator
TSG6 Multiburst generator
(2) TSG170D/Tektronix

PAL
Equivalent product: (1) 1411/Tektronix and the following plug-in units
SPG12 SYNC generator
TSG11 Color bar generator
TSG13 Linearity generator
TSG16 Multiburst generator
(2) TSG-273/Tektronix

Vectorscope / Waveform Monitor
NTSC
Equivalent Product: 1750/Tektronix

PAL
Equivalent product: 1751/Tektronix

Waveform Monitor (When used Vectorscope)
Equivalent product: 1485R/Tektronix

Monitor
NTSC
Equivalent product: BVM-1910 or BVM-2010/SONY

PAL
Equivalent product: BVM-2010P/SONY

Audio Oscillator / Analyzer
Equivalent product: TM5006/Tektronix and the following plug-in units
SG5010 Oscillator
AA5001 Analyzer

Spectrum Analyzer
Equivalent product: 8568B/Hewlett Packard

Video Noise Meter
Equivalent product: UPSF2/Rohde & Schwarz

Frequency Counter
Equivalent product: 5315/Hewlett Packard

AC Current Probe
Equivalent product: P6022/Tektronix
Band width: more than 100MHz

4-3. ALIGNMENT TAPE

The ER5-2 alignment tape is for electrical adjustments.
The ER2-2 alignment tape is for mechanical adjustments.
The following signals are recorded on it.

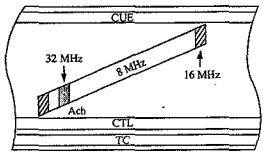
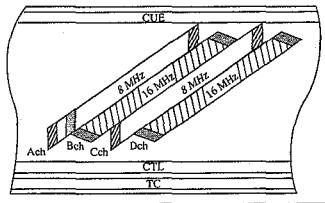
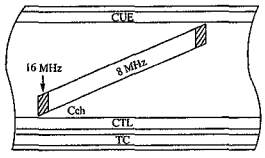
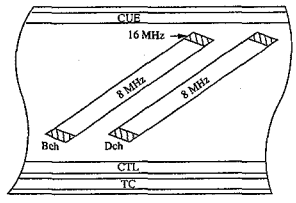
ER5-2 NTSC (SONY Part No.8-960-071-02)

TIMER min. sec	CUE	AUDIO		VIDEO	
		CONTENTS	USE	CONTENTS	USE
0.00					
1.55	1kHz, 0VU				
2.00		−∞ dB (no sound)		LINEARITY CH-A&CH-C only	REC CURRENT ADJ. CH-A&CH-C
2.55	10kHz, 0VU				
3.00					
3.55	1 kHz,-10VU				
4.00					
4.25	100Hz,-10VU				
4.30					
4.55	200Hz,-10VU				
5.00					
5.25	300Hz,-10VU				
5.30					
5.55	500Hz,-10VU				
6.00					
6.25	3kHz,-10VU				
6.30					
6.55	5kHz,-10VU	−∞ dB (no sound)		LINEARITY CH-B&CH-D only	REC CURRENT ADJ. CH-B&CH-D
7.00					
7.25	7.5kHz,-10VU				
7.30					
7.55	10kHz,-10VU				
8.00					
8.25	12kHz,-10VU				
10.00					
11.55	1kHz, 0VU				
12.00					
12.55	10kHz, 0VU				
13.00					
13.55	1kHz,-10VU				
14.00					
14.25	100kHz,-10VU				
14.30					
14.55	200Hz,-10VU				
15.00					
15.25	300Hz,-10VU				
15.30					
15.55	500Hz,-10VU	1kHz,+20VU	DA MSB ADJUSTMENT (AD-49 Board)	LINEARITY	RF PLAYBACK EQUALIZER ADJUSTMENT (EQ-29 Board)
16.00					
16.25	3kHz,-10VU				
16.30					GAIN,OFFSET ADJETTMENT (VM-05 Board)
16.55	5kHz,-10VU				
17.00					
17.25	7.5kHz,-10VU				
17.30					
17.55	10kHz,-10VU				
18.00					
18.25	12kHz,-10VU				
20.00					
		1kHz,0VU	GAIN ADJUSTMENT (LO-04 BOARD)	MULTI BURST	FREQUENCY RESPONSE ADJUSTMENT (VM-05 Board)
22.00					
				COLOR BARS	
24.00					REC CURRENT ADJ.

ER5-2 PAL (SONY Part No.8-960-071-52)

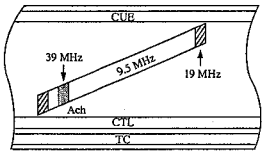
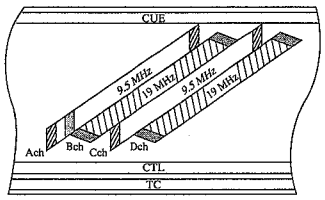
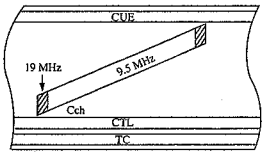
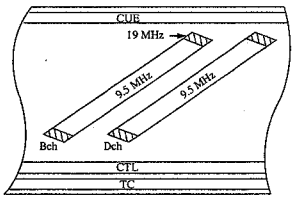
TIMER min. sec	CUE	AUDIO		VIDEO	
		CONTENTS	USE	CONTENTS	USE
0.00	1kHz, 0VU	−∞ dB (no sound)		LINEARITY CH-A&CH-C only	REC CURRENT ADJ. CH-A&CH-C
1.55 2.00	10kHz, 0VU				
2.55 3.00	1 kHz,-10VU				
3.55 4.00	100Hz,-10VU				
4.25 4.30	200Hz,-10VU				
4.55 5.00	300Hz,-10VU	−∞ dB (no sound)		LINEARITY CH-B&CH-D only	REC CURRENT ADJ. CH-B&CH-D
5.25 5.30	500Hz,-10VU				
5.55 6.00	3kHz,-10VU				
6.25 6.30	5kHz,-10VU				
6.55 7.00	7.5kHz,-10VU				
7.25 7.30	10kHz,-10VU				
7.55 8.00	12kHz,-10VU				
8.25 10.00	1kHz, 0VU	1kHz,+20VU	DA MSB ADJUSTMENT (AD-42 Board)	LINEARITY	RF PLAYBACK EQUALIZER ADJUSTMENT (EQ-29 Board) GAIN,OFFSET ADJUSTMENT (VM-05 Board)
11.55 12.00	10kHz, 0VU				
12.55 13.00	1kHz,-10VU				
13.55 14.00	100kHz,-10VU				
14.25 14.30	200Hz,-10VU				
14.55 15.00	300Hz,-10VU				
15.25 15.30	500Hz,-10VU				
15.55 16.00	3kHz,-10VU				
16.25 16.30	5kHz,-10VU				
16.55 17.00	7.5kHz,-10VU				
17.25 17.30	10kHz,-10VU				
17.55 18.00	12kHz,-10VU				
18.25 20.00		1kHz,0VU	GAIN ADJUSTMENT (LO-04 BOARD)	H-SWEEP	FREQUENCY RESPONSE ADJUSTMENT (VM-05 Board)
22.00				COLOR BARS	
24.00					REC CURRENT ADJ.

ER2-2 NTSC (SONY Part No.8-960-071-12)

TIMER -COLD	CUE CONTENT/USE	CONTENTS	USE For DVR-10/18	USE For DVR-20/28	TAPE FORMAT
0:00	10kHz 0VU / CUE HEAD AZIMUTH ADJ. (For DVR-20/28)	A ch ONLY (8MHz)	· TRACKING ADJ. · CTL POSITION ADJ. · PG PHASE ADJ. · CTL HEIGHT ADJ.	· TRACKING ADJ. (GUIDE ADJ.)	
15:00		A, C ch(8MHz) B, D ch(16MHz)	NOT USE	· CTL POSITION ADJ. · PG PHASE ADJ. · RECORD HEAD HEIGHT CHECK (A to D ch)	
20:00		C ch ONLY (8MHz)	RECORD C ch HEAD HEIGHT CHECK	NOT USE	
25:00		B, D ch (8MHz)	RECORD B, D ch HEAD HEIGHT CHECK	NOT USE	
30:00					

: 32 MHz
: 16 MHz
: 8 MHz

ER2-2 PAL (SONY Part No.8-960-071-62)

TIMER -COLD	CUE CONTENT/USE	CONTENTS	USE For DVR-10P/18P	USE For DVR-20P/28P	TAPE FORMAT
0:00					
	10kHz 0VU / CUE HEAD AZIMUTH ADJ. (For DVR-20P/28P)	A ch ONLY (9.5MHz)	· TRACKING ADJ. · CTL POSITION ADJ. · PG PHASE ADJ. · CTL HEIGHT ADJ.	· TRACKING ADJ. (GUIDE ADJ.)	
15:00		A, C ch(9.5MHz) B, D ch(19MHz)	NOT USE	· CTL POSITION ADJ. · PG PHASE ADJ. · RECORD HEAD HEIGHT CHECK (A to D ch)	
20:00		C ch ONLY (9.5MHz)	RECORD C ch HEAD HEIGHT CHECK	NOT USE	
25:00		B, D ch (9.5MHz)	RECORD B, D ch HEAD HEIGHT CHECK	NOT USE	
30:00					

: 39 MHz
: 19 MHz
: 9.5 MHz

SECTION 5
PERIODIC CHECK AND MAINTENANCE

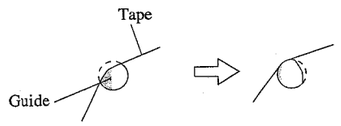
The periodic check and maintenance below must be performed to fulfill the function and performance of the set and to lengthen the life of the set and tape. Execute the item below as usual maintenance.

- **Cleaning of tape running path and sliding block (See Section 5-2.)**

5-1. PERIODIC CHECK ITEM

- The periodic check time of major parts is shown in the table. The replacement time shown in the table does not mean the guarantee time of parts. The grease smearing, check, and replacement time varies depending on the condition of the set to be used. Make a maintenence inspection schedule referring to them.
- **The time shown in this table is measured using a head hour meter (by Drum Running for the Brush Slip Ring Ass'y only). For more information, refer to the "Operation Manual".**
- If the object part is unknown, refer to the corresponding page of the Maintenance Manual (the page of the exploded view in the table).

Note 1: ◎ (rotation) indicates to rotate the guide so that the worn portion of a stationary guide does not touch the tape. Rotate the guide clockwise at intervals of 90 degrees as the reference.



Note 2: Symbol " ↑ " in the table indicates that the part in the column over it is automatically replaced during replacement.

○: Cleaning □: Smear grease △: Check (Adjustment) ☆: Replacement ◎: Rotation

BLOCK NAME OR PART NAME	Part No.	PAGE OF SECTION 21	HEAD HOURS METER (TIME) WEEKLY	MONTHLY	500	2500	5000	7500	10000	REMARKS
TRACKING CHECK				△						
DRUM BLOCK										
DRUM Ass'y (DDH-26A)	A-6050-761-	21-24, 25	○				☆		☆	• As for cleaning refer to Section 5-2. • As for Replacement, refer to Section 6-5.
INNER DRUM Ass'y (DDH-26)	A-6052-136-	21-24, 25	○		△		↑		↑	• As for Replacement, refer to Section 6-4.
BRUSH SLIP RING Ass'y	A-6053-077-	21-24, 25				☆	↑	☆	↑	• The hours shown in the table are based on the Drum Running Hours. • As for Replacement, refer to Section 6-6.
CLEANING ROLLER Ass'y	A-6049-042-	21-24, 25				△	☆	△	☆	• As for Replacement, refer to Section 6-7.
CLEANING ROLLER	X-3735-903-	21-24, 25			△	☆	↑	☆	↑	• As for Replacement, refer to Section 6-7. • When replacing the Inner-Drum Ass'y, replace the cleaning Roller.
CASSETTE COMPARTMENT BLOCK										
CASSETTE COMPARTMENT Ass'y	A-6028-027-	21-14, 15		○		□	□	☆	□	• As for Cleaning, refer to Section 5-2. • As for smear grase, refer to Section 5-5. • As for Replacement, refer to Section 6-2 and 6-3.
CASSETTE COMPARTMENT MOTOR	8-835-123-	21-14, 15						↑		
S/T REEL TABLE BLOCK										
REEL TABLE Ass'y	A-6029-056-	21-16, 17		○				☆		• As for Cleaning, refer to Section 5-2. • As for Replacement, refer to Section 6-8.
REEL MOTOR (U-6C)	8-835-446-	21-16, 17						☆		• As for Replacement, refer to Section 6-8.
REEL BRAKE Ass'y	———	21-16, 17								• As for Replacement, refer to Section 6-8.
PLUNGER SOLENOID	1-454-433-	21-16, 17						☆		• As for Replacement, refer to Section 6-8.
BRAKE ARM Ass'y	X-3715-435-	21-16, 17				☆	☆	☆	☆	• As for Replacement, refer to Section 6-8.
FLEXIBLE CARD WIRE	1-590-997-	21-16, 17				△	△	☆	△	• As for Replacement, refer to Section 6-8.
REEL SHIFT BLOCK										
REEL SHIFT MOTOR (DNR-4700A)	8-835-055-	21-16, 17				△	△	☆	△	• As for Check/Replacemt, refer to Section 6-9.
S/T WORM GEAR	3-715-354-	21-16, 17				□	□	□	□	• As for smear grase, refer to Section 5-5.
S/T WORM WHEEL	3-722-807-	21-16, 17				□	□	□	□	• As for smear grase, refer to Section 5-5.
TIMING BELT	3-715-359-	21-16, 17				△	△	☆	△	• As for Check/Replacement, refer to Section 6-9.
S TENSION REGULATOR BLOCK										
S TENSION REGULATOR Ass'y	A-6029-208-	21-18, 19				△	△	☆	△	
S TENSION REGULATOR ARM Ass'y	X-3166-006-	21-18, 19						↑		
ROLLER GUIDE Ass'y (S4 Guide)	X-3743-129-	21-18, 19	○			△	☆	△	☆	
FLEXIBLE CARD WIRE	1-590-999-	21-18, 19				△	△	☆	△	
S GUIDE BASE (TAPE SENSOR) BLOCK										
ROLLER GUIDE (N) Ass'y (S5 Guide)	X-3715-375-	21-18, 19	○			△	☆	△	☆	
ROLLER GUIDE (X) Ass'y (S6 Guide)	X-3715-480-	21-18, 19	○			☆	☆	☆	☆	
TAPE CLEANER BLOCK										
TAPE CLEANER	X-3715-529-	21-18, 19	○				△		△	• Perform replacement by installing the upper and lower Sides parts reversely.
PLUNGER SOLENOID	1-454-487-	21-18, 19						☆		
ROLLER GUIDE (N) Ass'y (S3 Guide)	X-3715-375-	21-18, 19	○			△	☆	△	☆	• As for Cleaning, refer to Section 5-2.
FULL ERASE HEAD	8-825-770-	21-18, 19	○							• Perform replacement according to necessary.
T ARM BLOCK										
PINCH ROLLER Ass'y	X-3165-947-	21-20, 21	○		△	☆	☆	☆	☆	• Perform the Check/Cleaning every 500h. • When replacing the Inner durm Ass'ys, replace the Pinch Roller.
ROLLER GUIDE (N) Ass'y	X-3715-375-	21-20, 21				△	☆	△	☆	

○: Cleaning　□: Smear grease　△: Check (Adjustment)　☆: Replacement　◎: Rotation

BLOCK NAME OR PART NAME	Part No.	PAGE OF SECTION 21	HEAD HOURS METER (TIME)							REMARKS
			WEEKLY	MONTHLY	500	2500	5000	7500	10000	
T GUIDE BASE BLOCK										
T TENSION REGULATOR Ass'y	A-6029-203-	21-20, 21				△	△	☆	△	
T TENSION REGULATOR Arm Ass'y (T6 Guide)	X-3165-940-	21-20, 21	○			☆	☆	↑	☆	• As for Cleaning, refer to Section 5-2.
AIR DUMPER	3-173-109-	21-20, 21	○			△	△	↑		
ROLLER GUIDE (X) Ass'y (T7 Guide)	X-3715-480-	21-20, 21				☆	☆	☆	☆	• As for Cleaning, refer to Section 5-2.
PINCH ROLLER PRESS BLOCK										
PINCH PRESS PLATE	3-722-834-	21-20, 21				△	△	☆	△	
PLUNGER SOLENOID	1-454-434-	21-20, 21				△	☆	△	☆	
SUB PLUNGER SOLENOID	1-454-433-	21-20, 21				△	☆	△	☆	
PLUNGER PIN	3-715-398-	21-20, 21				△	△	☆	△	
STATIONARY HEAD BLOCK										
AUDIO/CTL HEAD	8-825-772-	21-20, 21	○			△	☆	△	☆	• As for Cleaning, refer to Section 5-2.
CONFIDENCE HEAD	8-825-777-	21-20, 21	○			△	☆	△	☆	• As for Cleaning, refer to Section 5-2.
STATIONARY FRANGE (T3 Guide)	3-722-827-	21-20, 21	○			◎	◎	☆	◎	• As for Cleaning, refer to Section 5-2.
STATIONARY GUIDE (T3 Guide)	3-722-828-	21-20, 21	○			◎	◎	☆	◎	• As for Cleaning, refer to Section 5-2.
CAPSTAN MOTOR (SCU-0201A)	8-835-444-	21-20, 21	○			△	△	☆	△	• As for Cleaning, refer to Section 5-2.
SLIDER RAIL BLOCK										
SLIDER (S) Ass'y	A-6029-211-	21-22, 23				□/△	□/△	☆	□/△	
SLANT GUIDE (S1 Guide)	3--722-780-	21-22, 23	○			☆	☆	☆	☆	• As for Cleaning, refer to Section 5-2.
ACTUATER Ass'y (S2 Guide)		21-22, 23	○			△	△	☆	△	• As for Cleaning, refer to Section 5-2.
SLIDER (T) Ass'y	A-6029-212-	21-22, 23				□/△	□/△	☆	□/△	
SLANT GUIDE (T1 Guide)	3-722-780-	21-22, 23	○			☆	☆	☆	☆	• As for Cleaning, refer to Section 5-2.
ACTUATER Ass'y (T2 Guide)		21-22, 23	○			△	△	☆	△	• As for Cleaning, refer to Section 5-2.
L D RAIL	3-170-990-	21-22, 23		○		△	△	☆	△	• As for Cleaning, refer to Section 5-2.
V PLATE	3-170-937-	21-24, 25		○		△	△	☆	△	
LOADING MOTOR Ass'y										
LOADING MOTOR (MNR-7400A)	8-835-123-	21-22, 23				△	△	☆	△	
BALL BEARING	3-722-752-	21-22, 23				△	△	☆	△	
WORM GEAR	3-715-435-	21-22, 23				□	□	□	□	
MAIN SHAFT BLOCK										
BALL BEARING	3-715-874-	21-22, 23				△	△	☆	△	
WORM GEAR (S)	3-715-436-	21-22, 23				□	□	□	□	• As for smear grease, refer to Section 5-5.
WORM GEAR (T)	3-715-325-	21-22, 23				□	□	□	□	• As for smear grease, refer to Section 5-5.
C COVER	3-722-610-	21-16, 17		○				☆		
POWER SWITCH	1-570-052-	21-8, 9				△	△	☆	△	
FAN MOTOR (SMALL)	1-541-436-	21-8, 9						☆		
FAN MOTOR (LARGE)	1-541-901-	21-10, 11						☆		• As for Cleaning, refer to Section 5-2.

5 - 3

5-2. CLEANING

Basic Knowledge

A. Pay attention to the following when cleaning:
   1. Turn the power off before cleaning.
   2. Each part (specially in the TTP block) of a machine is constituted by a precision part and adjusted precisely. Be careful not to damage each part or to apply an excessive force.
   3. Do not touch the portion to which grease is smeared when cleaning. If cleaning cloth is used with the grease attached, grease may attach to the places except those required. If grease attaches to cleaning cloth, replace the cleaning cloth with new one.

B. Clean the following places: (Fig. 5-2-1)
   5-2-1. Upper Drum's Tape Running Path and Rotary Head
   5-2-2. Lower Drum's Tape Running Path and Lead Surface
   5-2-3. Tape Running System
   5-2-4. Stationary Head and Tape Cleaner
   5-2-5. Slider Rail
   5-2-6. Reel Table
   5-2-7. Fan Motor
   5-2-8. Cassette Compartment

C. Remove the Cassette Compartment before cleaning each place. For the removal of the Cassette compartment, See section 6-2.

D. Be sure to clean each place during periodic check. Increase the number of check times in accordance with the environment of the set to be used and perform the cleaning.

E. Usually clean each place with cleaning fluid. However, there are some places in which no cleaning fluid must be used. Before cleaning, refer to the basic knowledge.

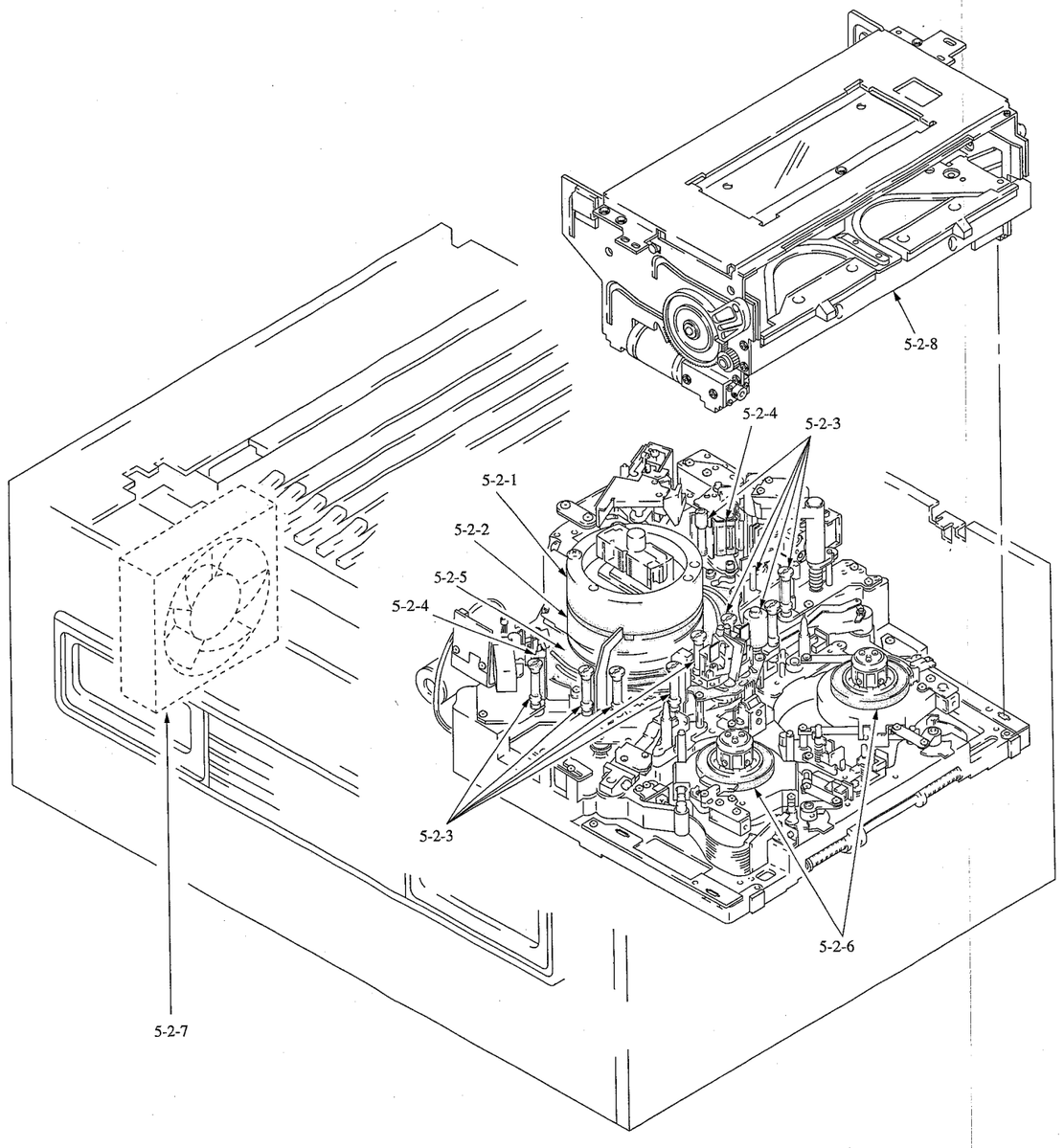


Fig. 5-2-1. Cleaning Place

5-2-1. Upper Drum's Tape Running Path and Rotary Head

Basic Knowledge

A. Prepare the following tools:
- Cleaning Piece
  Sony Part No.: 2-034-697-00
- Cleaning Fluid
  Sony Part No.: 9-919-573-00 or the equivalent

B. Clean the upper drum's tape running path and rotary head while paying attention to the following: (Fig. 5-2-2)

Note 1: Do not rotate it in the direction opposite to the specified direction (direction indicated by the arrow) or clean it in the vertical direction when cleaning the rotary head. This may damage the rotary head.
Rotate the inner drum slowly in the specified direction and clean the rotary head along the circumference.

Note 2: Do not use a cotton swab when cleaning the rotary head.

Cleaning procedures

1. Press the cleaning piece moistened with cleaning fluid slightly against the upper drum's side surface and rotary head.
2. Rotate the inner drum slowly in the direction indicated by the arrow and clean the rotary head along the circumference two or three times.
3. After cleaning, clean it with dry cloth two or three times.

Note: For the cleaning of the upper drum's tape running path, clean the diagonally striped portion (the lower edge of the upper drum) shown in the figure with care.

Clean the upper drum's tape running path and rotary head every week.

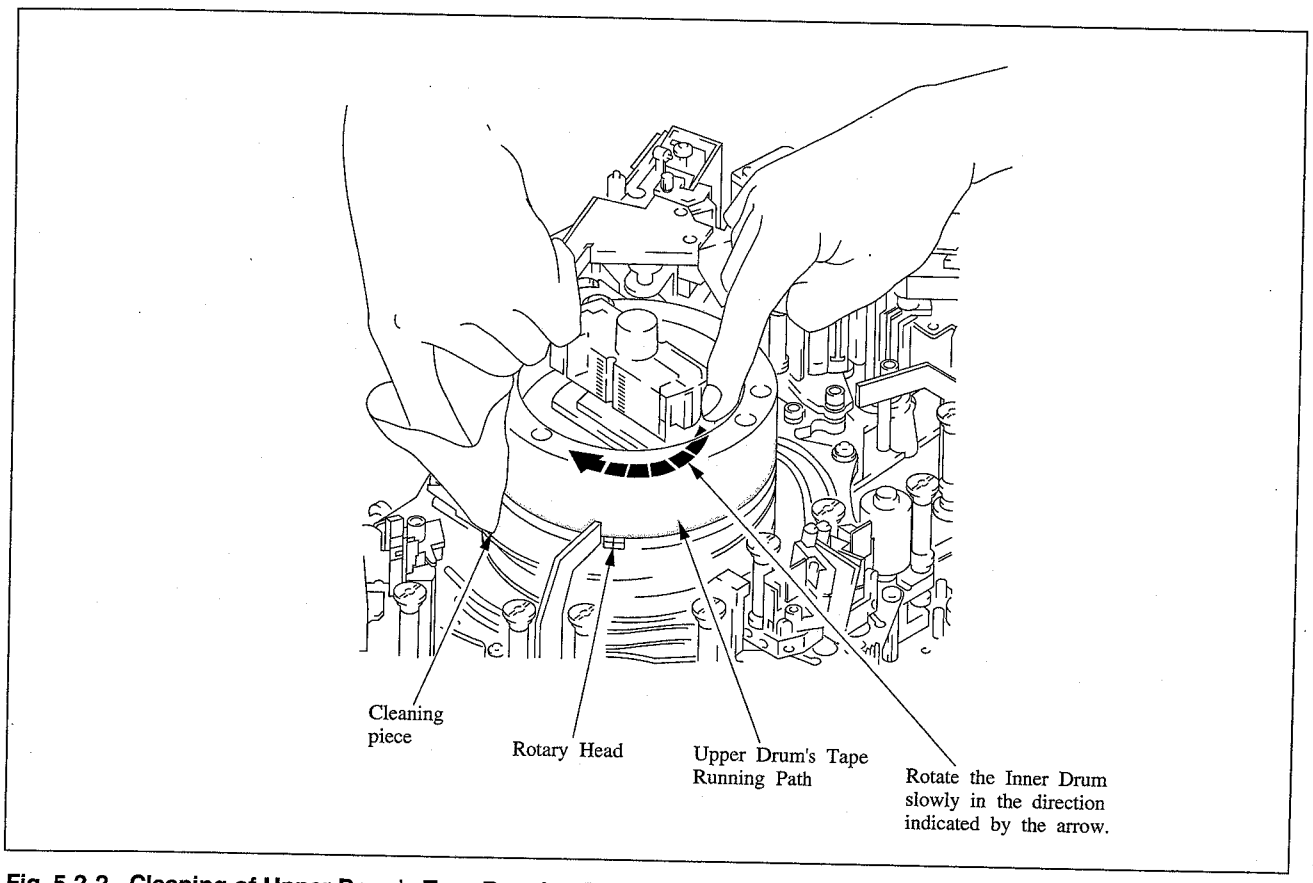


Fig. 5-2-2. Cleaning of Upper Drum's Tape Running Path and Rotary Heads

How to use cleaning cassette (Fig. 5-2-3)

• Cleaning cassette (DCS-12CL or DCM-12CL)

1. The cleaning cassette is used only when the rotary head clogging cannot be evaded by head cleaning. Do not use it for except the above.
2. Set the cleaning time to within five seconds in the PLAY mode. Do not use the cleaning cassette in modes other than PLAY.
   Do not use it continuously for more than five seconds. This may cause the deterioration of the rotary head life.
3. The cleaning cassette can be used only once. Do not rewind it for reuse.

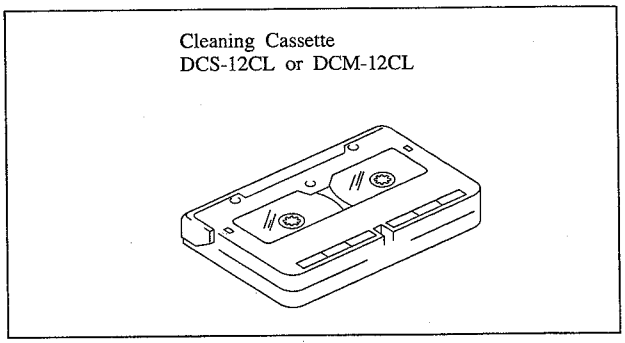


Fig. 5-2-3. Cleaning cassette

Head tip microscope (Fig. 5-2-4)

Use a head tip microscope to confirm that the head cleaning is performed completely.

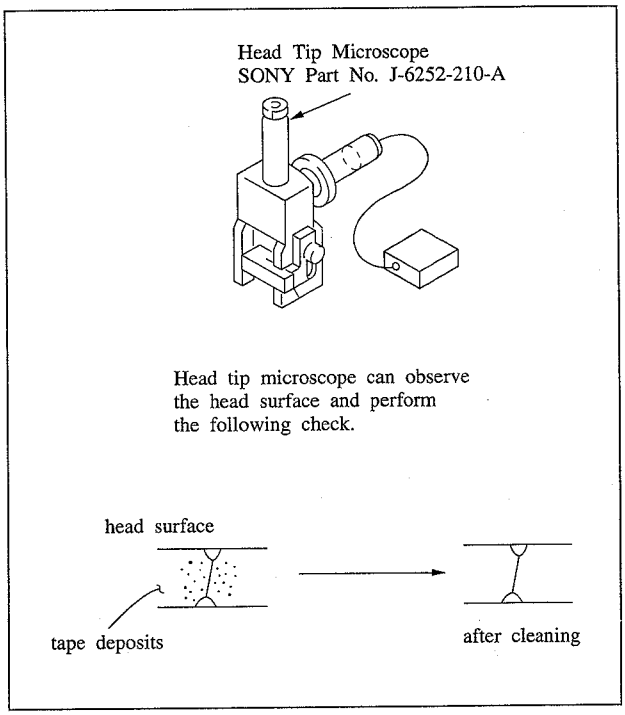


Fig. 5-2-4. Head tip microscope

5-2-2. Lower Drum's Tape Running Path and Lead Surface

Basic Knowledge

Prepare the following tools:

- Cleaning Piece
  Sony Part No.: 2-034-697-00
- Cleaning Fluid
  Sony Part No.: 9-919-573-00 or the equivalent
- Skewer or the equivalent (A metallic skewer cannot be used.)

Cleaning procedures (Fig. 5-2-5)

1. Put a skewer (or the equivalent) along the drum lead surface and eliminate the magnetic powder.
2. Clean the drum lead surface and lower drum's tape running path with cleaning piece moistened with cleaning fluid.
3. After cleaning, clean with dry cleaning piece two or three times.

Note 1: Tracking may be badly influenced when magnetic powder attaches to the drum lead surface. Clean the drum lead surface during periodic check.

Note 2: Do not use a metallic skewer instead of the skewer. This may damage the tape running path.

Clean the lower drum's tape running path and lead surface every week.

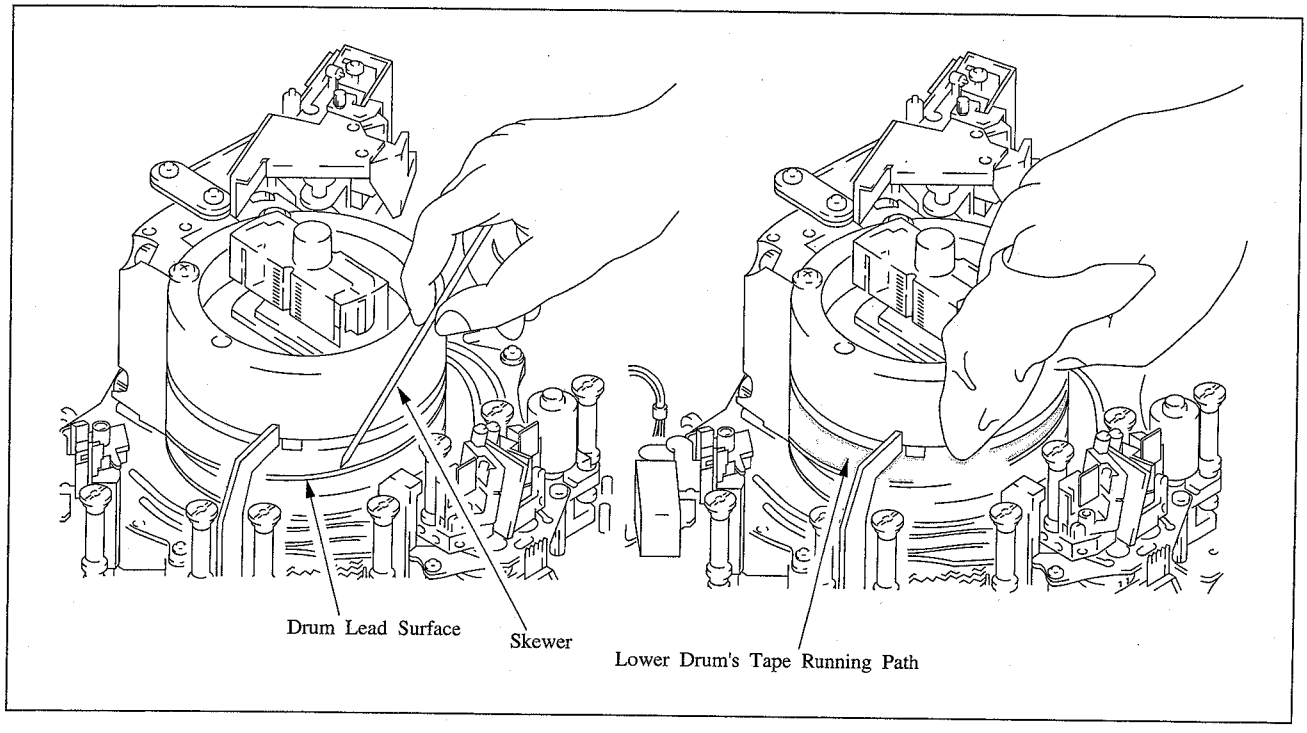


Fig. 5-2-5. Cleaning of Lower Drum's Tape Running Path and Lead Surface

5-2-3. Tape Running System Basic Knowledge

Prepare the following tools:

- Cleaning Piece
  Sony Part No.: 2-034-697-00
- Cleaning fluid
  Sony Part No.: 9-919-573-00 or the equivalent

1. Clean the tape running path of the guides shown in Fig. 5-2-6 with cleaning piece moistened with cleaning fluid.
2. After cleaning, clean with dry cleaning piece two or three times.

Note 1: The tape guide is constituted by a precision part. The height of each tape guide is adjusted precisely. Be careful not to apply an excessive force when cleaning.

Note 2: The tape powder or back-coated agent easily attaches near S1 and T1 guides. Remove stains completely from the guides.

Clean the tape running system every week.

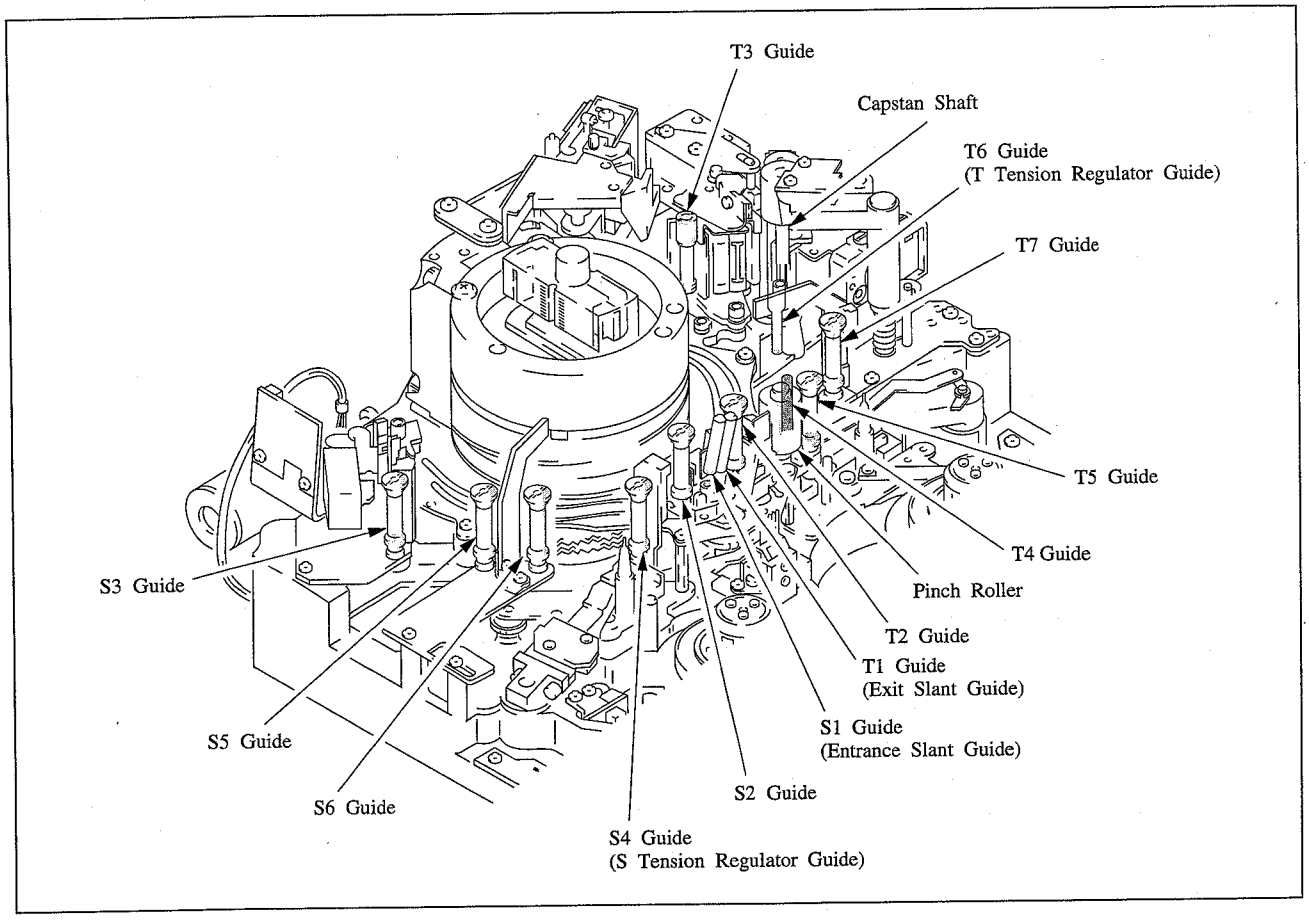


Fig. 5-2-6. Cleaning of Tape Running System

5-2-4. Stationary Head and Tape Cleaner

Basic Knowledge

A. Prepare the following tools:
   - Cleaning Piece
     Sony Part No.: 2-034-697-00
   - Cleaning Fluid
     Sony Part No.: 9-919-573-00 or the equivalent

B. The tape running surface of a tape cleaner has a sharp edge. Do not touch the edge with bare hands.

Cleaning procedures (Fig. 5-2-7)

1. Clean the tape running path of a head in the vertical direction with cleaning piece moistened with cleaning fluid.
2. Clean the tape running surface (sharp edge) of a tape cleaner with cleaning piece moistened with cleaning fluid.
3. After cleaning, clean with dry cleaning piece two or three times.

Note 1: An error may occur in the recording or playback when magnetic powder attaches to the head gap portion of a full erase head and stationary head. Be sure to clean the gap portion during periodic check.

Note 2: A full erase head, stationary head, and tape cleaner are constituted by a precision part. The installing position is also adjusted precisely. Be careful not to apply an excessive force when cleaning.

Clean the stationary head and tape cleaner every week.

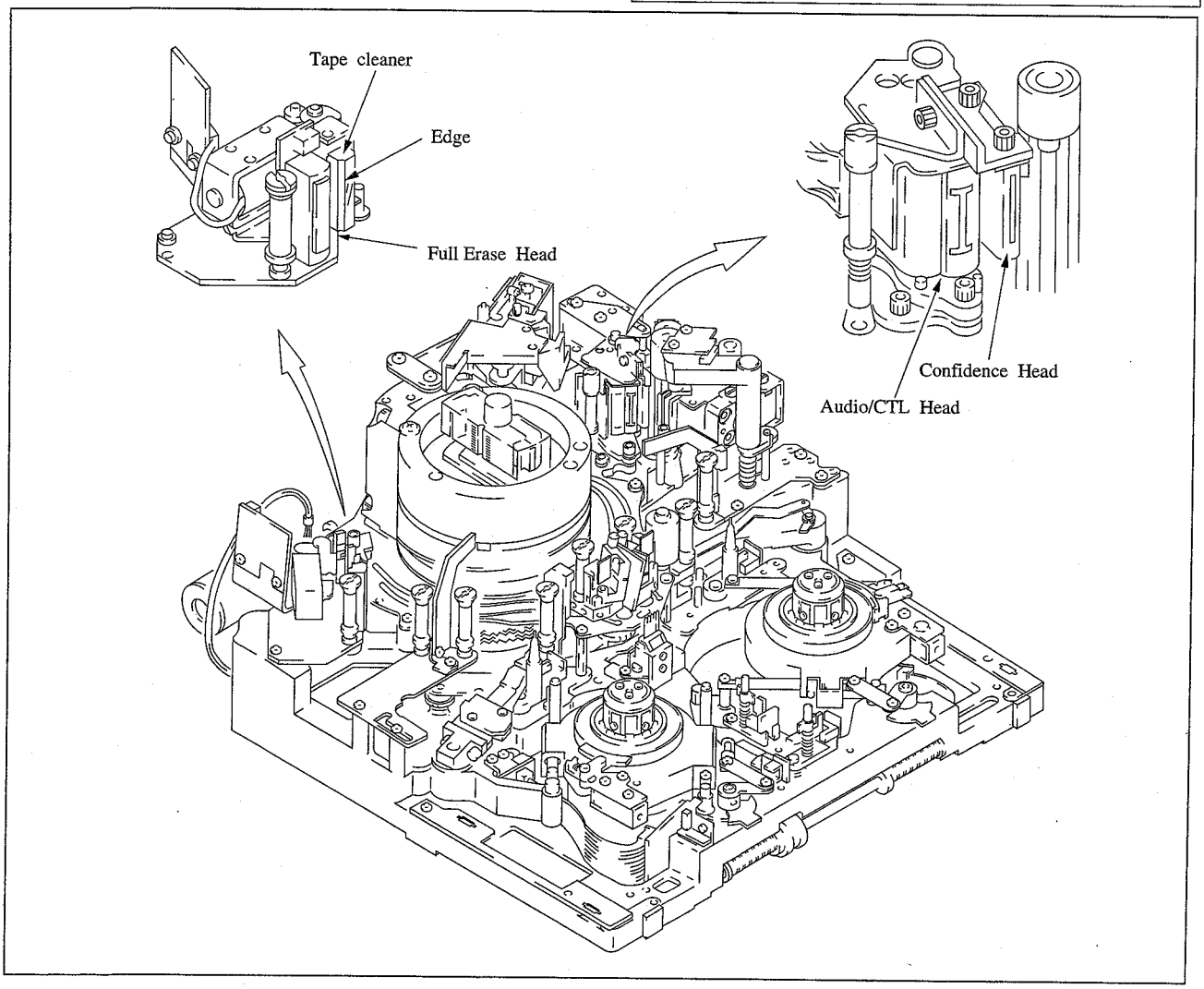


Fig. 5-2-7. Cleaning of Stationary Head and Tape Cleaner

5-2-5. Slider Rail

Basic Knowledge

A. Prepare the following tools:
- Cloth (or gauze)
- Cleaning Fluid
  Sony Part No.: 9-919-573-00 or the equivalent

Cleaning procedures (Fig. 5-2-8)

1. Clean the slider running path of a slider rail with cloth (or gauze) moistened with cleaning fluid.
2. After cleaning, clean with dry cleaning piece two or three times.

Note: A trouble occurs in the last position control of a slider block when large dust attaches to the slider rail surface. This may cause the tracking shift. Be sure to clean the slider rail during periodic check.

Clean the slider rail during periodic check (every month).

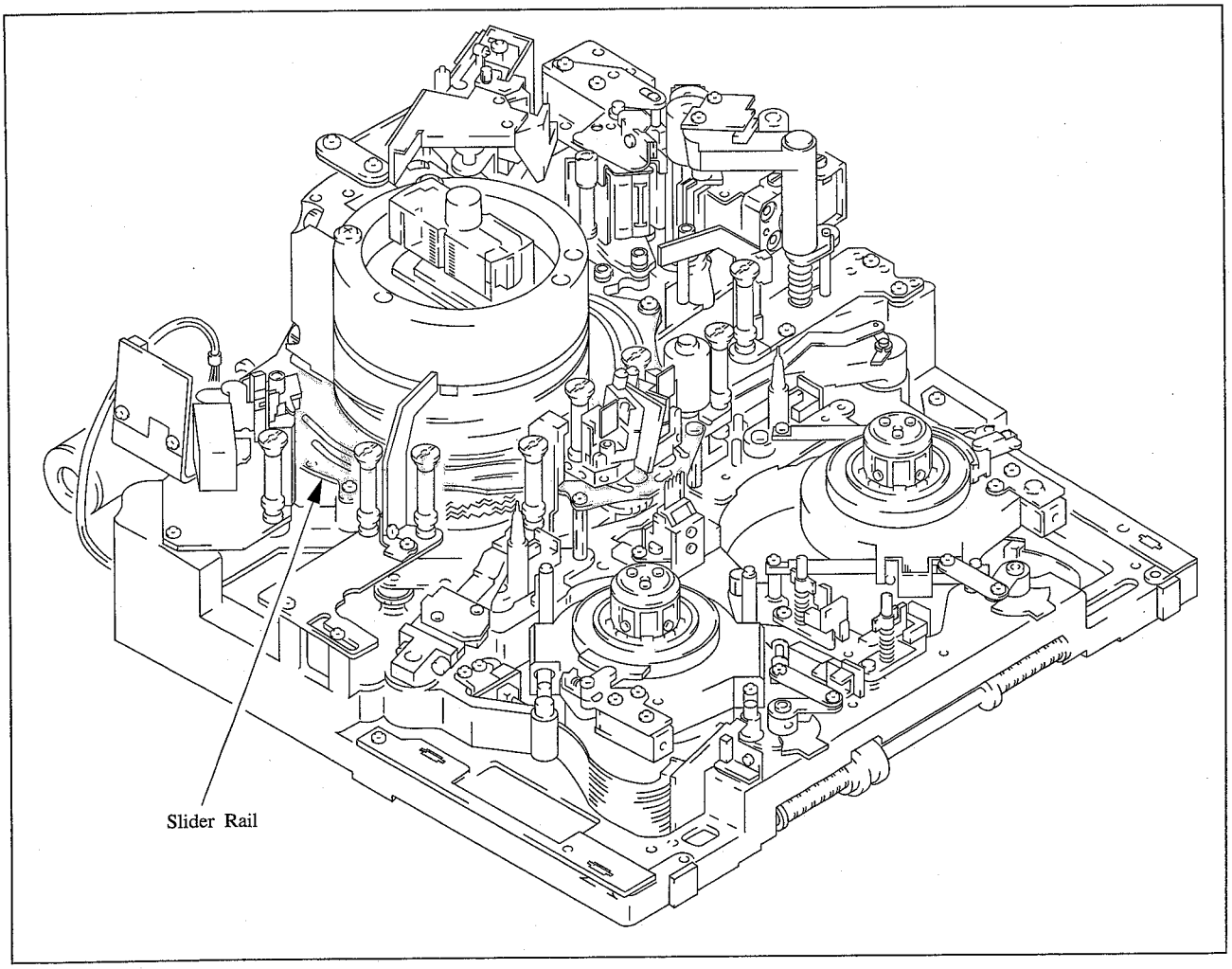


Fig. 5-2-8. Cleaning of Slider Rail

5-2-6. Reel Table

Basic Knowledge

A. Prepare the following tool:
- Cloth (or gauze)

Cleaning procedures (Fig. 5-2-9)

1. Clean the cassette reel support surface of a reel table and the contact surface of a reel brake with dry cloth.
2. Clean the Cassette Support Pin (A) and Reference Pin Ass'y with dry cloth.

Clean the reel table every month.

Note 1: Do not use cleaning fluid. Take care that no cleaning fluid attaches to the brake shoe. This deteriorates the characteristic of a reel brake and shortens the life of the part.

Note 2: Confirm the stains on the cassette reel support surface and at the cassette support pin when a new tape is used frequently. The powder that is generated by the rubbing of a cassette case attaches to the reel table and cassette support pin. This may exert a bad influence on the tape running.
Increase the number of check times during periodic check and in accordance with the environment of the set to be used, then perform the cleaning.

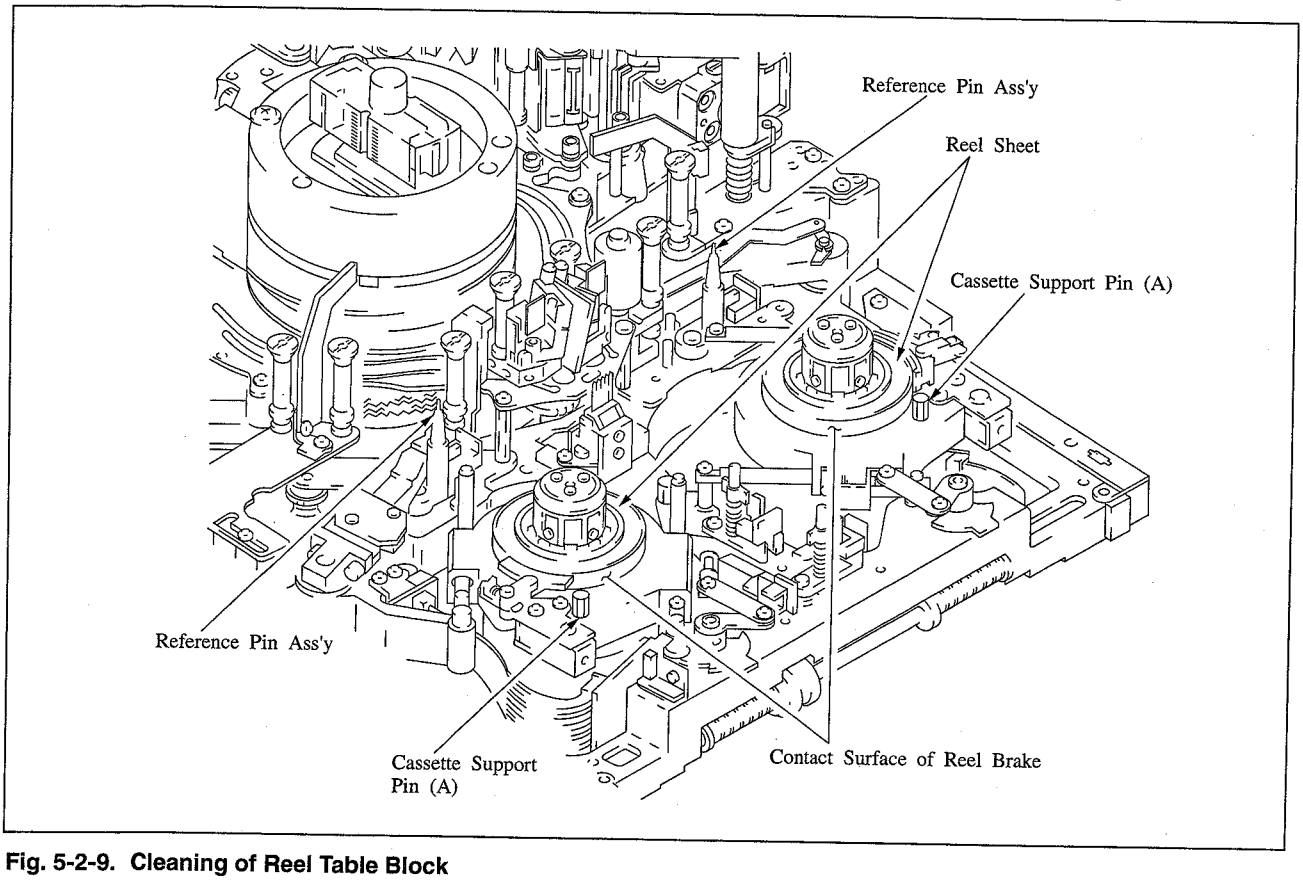


Fig. 5-2-9. Cleaning of Reel Table Block

5-2-7. DC Fan Motor

Basic Knowledge

A. Prepare the following tools:
- Cleaning Fluid
  Sony Part No.: 9-919-573-00 or the equivalent
- Nylon brush (or the equivalent) (A metallic brush cannot be used.)

Cleaning procedures (Fig. 5-2-11)

- Fan cover cleaning
  As shown in the figure, remove the dust by a dry brush and absorb it using a vacuum cleaner.
- Fin block cleaning
  As shown in the figure, clean the fin block of a fan motor in the same manner as in the fan cover (See section 2 for removal).

Note: The temperature in the set increases when dust attaches to the opening block of a DC fan motor and when the air flow is disturbed. This may badly influence the performance and life of the machine. Clean the DC fan motor (Fig. 5-2-10), especially fan cover on the rear panel during periodic check because they easily contain dust.

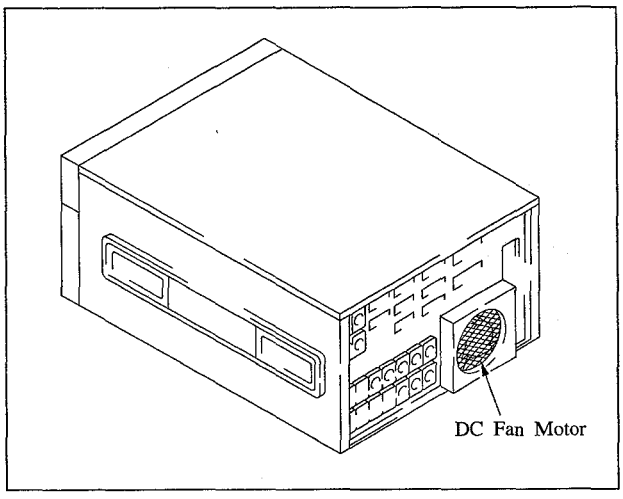


Fig. 5-2-10. DC Fan Motor

Clean the DC fan motor every month.

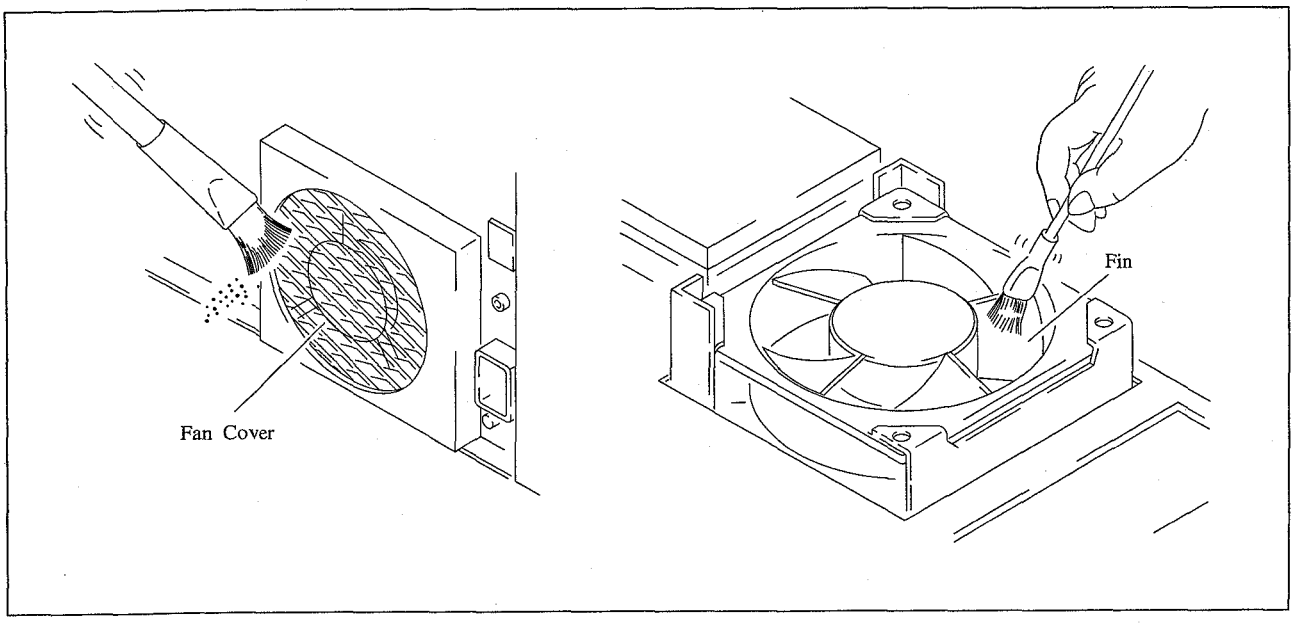


Fig. 5-2-11. Cleaning of DC Fan Motor

5-2-8. Cassette Compartment

Basic Knowledge

A. The Cassette Compartment is set to the cassette-down position when the wheel of the Cassette Compartment Ass'y shown in the figure is turned clockwise. The Cassette Compartment is set to the cassette-up position when it is turned counterclockwise. Move the compartment up and down, then clean it.

B. Prepare the following tool for cleaning:
   • Cloth (or gauze)

Cleaning procedures

1. Absorb the dust on the compartment block from the cassette insertion inlet of the Cassette Compartment using a vacuum cleaner.
2. Clean the compartment block with dry cloth.

Note 1: Be careful not to apply an excessive force to the sun roof and compartment.

Note 2: Do not clean the sun roof and cassette compartment door with alcohol. This may cause a crack.

Clean the Cassette Compartment every month.

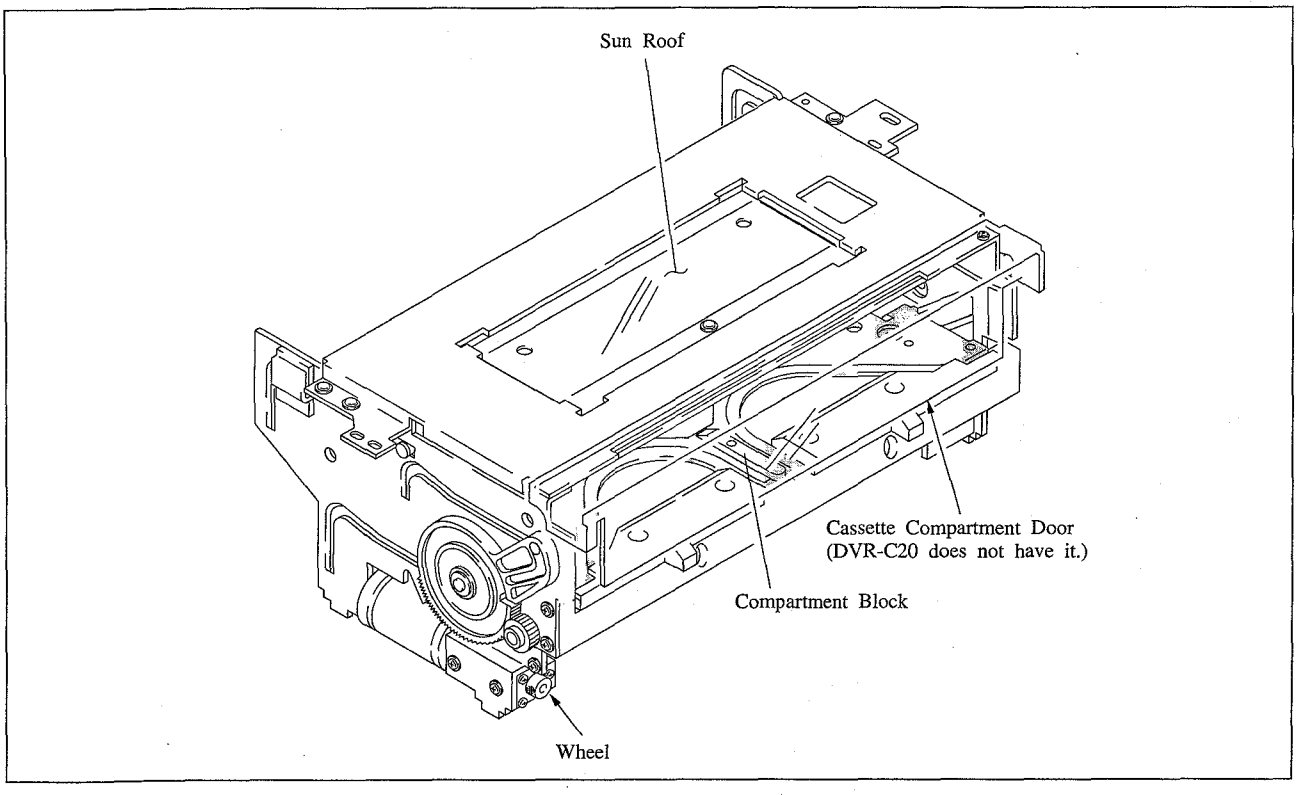


Fig. 5-2-12. Cleaning of Cassette Compartment Ass'y

5-3. TRACKING CHECK

Basic Knowledge

A. Prepare the following tool for the tracking check:

For DVR-20/C20

- Alignment Tape ER2-2 (NTSC)
  Sony Part No.: 8-960-071-12

For DVR-20P/C20P

- Alignment Tape ER2-2 (PAL)
  Sony Part No.: 8-960-071-62

B. When the Drum Ass'y or Inner Drum Ass'y is replaced, put the set into the REC mode and record a blank tape for about 20 minutes before this check.

Fig. 1

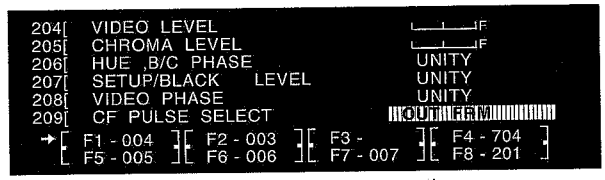


Fig. 2

Fig. 5-3-1. Indication on the Display in Tracking Check (BKDV-200/201)

BKDV-200/201

Tracking check

1. Extract the signals below from the REC board.
   (1) Connect a probe (oscilloscope) to TP102 (REC CH-A OUT) on the REC board.
   (2) Connect the GND pin of an oscilloscope to the shielding case on the REC board.
   (3) Connect the CF PULSE OUT pin (BNC connector) on the connector panel as a trigger input.

2. Press the keys on the control panel in the order below.
   (1) Press the SET UP key to enter the Menu Mode.
   (2) Select No. 209 CF PULSE SELECT by pressing the SEARCH DIAL key or the [∧] or [∨] key. (See Figure 5-3-1 and Figure 1.)
   (3) Set SELECT mode by pressing the [>] key.
   (4) Select "OUT FRM" by pressing the [∧] key. (See Figure 5-3-1 and Figure 2.)
   (5) Set ITEM SELECT mode by pressing the [<] key.
3. Insert an alignment tape and play back the CH-A recording signal on the alignment tape.
4. Set "VTR" mode by pulling the TRACKING control knob.
5. Adjust the playback RF amplitude by turning the TRACKING control knob so that it rests at the maximum value.
6. Confirm that the RF waveform satisfies the specification. If not, make a tracking adjustment.
7. Push the TRACKING control knob to end the "VAR" mode.

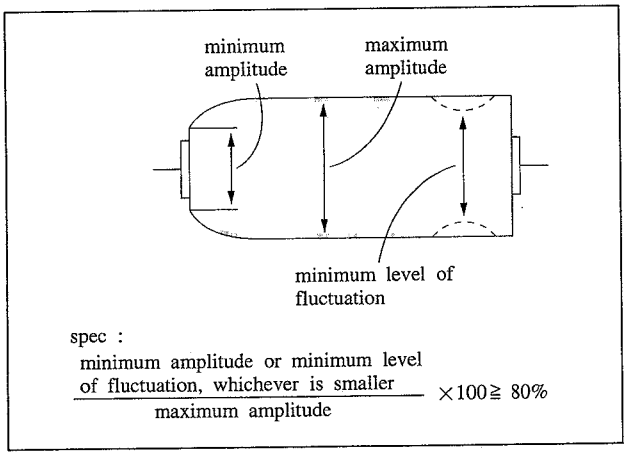


Fig. 5-3-2. Tracking Check

BKDV-101

Note: The control panel (serial numbers 1001 through 17150) that is used in DVR-10 or DVR-18 cannot be used in the DVR-20 series. To use the control panel in the DVR-20 series, remodeling is required. For more information, consult your nearest service facility.

Tracking check

1. Extract the signals below from the REC board.
   The signal extraction varies depending on the type of a board.
   (1) Connect a probe (oscilloscope) to TP102 (REC CH-A OUT) on the REC board.
   (2) Connect the GND pin of an oscilloscope to the shielding case on the REC board.
   (3) Connect the CF PULSE OUT pin (BNC connector) on the connector panel as a trigger input.

2. Press the keys on the control panel in the order below.
   VIDEO OUT, F11
   The CF PULSE display is set to "OUT FRM".
3. Insert an alignment tape and play back the CH-A recording signal on the alignment tape.
4. Press the keys on the control panel in the order below.
   TEST, F5 (RF), F1
   The TRACKING display is set to "VAR".
5. Turn the adjustment control on the control panel and adjust so that the playback RF amplitude is maximum.
6. Confirm that the RF waveform satisfies the specification. If not, perform the tracking adjustment.
7. Press the F1 key to return to the "FIX" display.

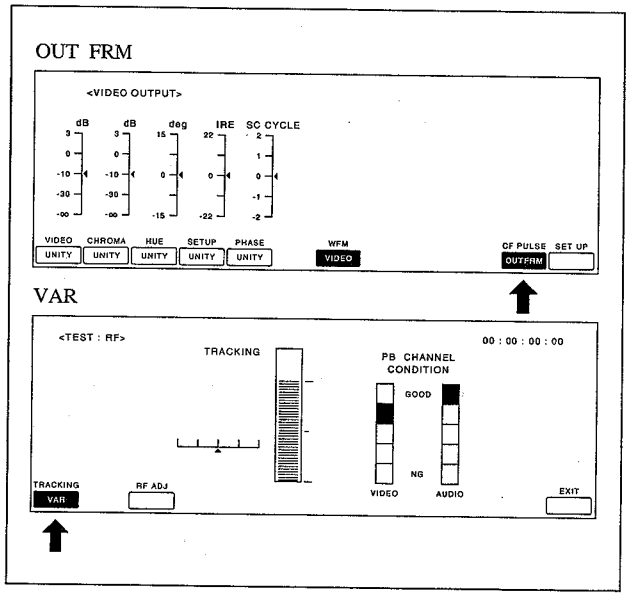


Fig. 5-3-3. Indication on the Display in Tracking Check (BKDV-101)

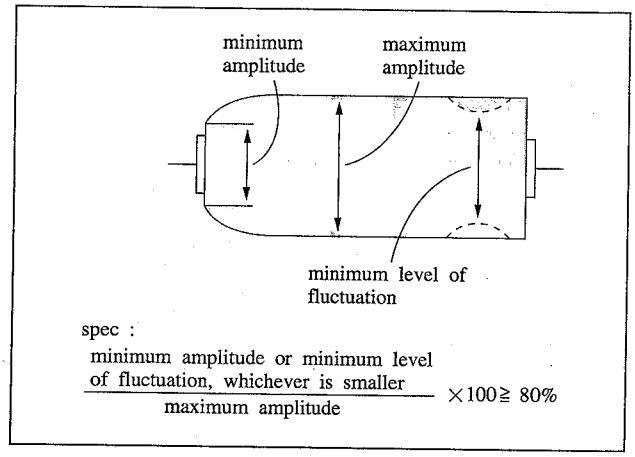


Fig. 5-3-4. Tracking Check

5-4. HEAD PROJECTION CHECK

Basic Knowledge

A. Recording and playback can be performed if the projection of any head is more than 30 μm.

B. Prepare the following tool for the measurement of head projection:
- Inner Drum Eccentricity Adjustment Tool JB-5401
  Sony Part No.: J-6254-010-A

5-4-1. Inner Drum Eccentricity Adjustment Tool

Basic Knowledge

A. Confirm the item below before using this adjustment tool. This confirmation is required for the accurate adjustment or the protection of a tool and machine part.

1. Turn the probe of a tool downwards as shown in Fig. 5-4-2, hold it with a finger, and confirm that the probe smoothly falls when the finger is released. Clean the tool if the probe does not fall.

B. Prepare the following tools:
- Cleaning Piece
  Sony Part No.: 2-034-697-00
- Cleaning Fluid
  Sony Part No.: 9-919-573-00 or the equivalent

Cleaning procedures of inner drum eccentricity adjustment tool

(1) Turn the screw shown in Fig. 5-4-3 counterclockwise two or three times and remove the holder.
Note: Be careful not to lose the compression coil spring installed in the tool when the holder is removed.

(2) Remove the probe from the holder, then clean the probe and the circumference block of a holder's probe installing hole with cleaning piece moistened with cleaning fluid.

(3) Install the probe in the holder and move the probe back and forth four or five times.

(4) Install the holder in the tool.

2. Clean the head contact surface of the probe before measurement and confirm that there is no crack and stain on the surface.

Note: The crack and stain on the head contact surface causes an inaccurate measurement.
This may also damage the head. Replace the probe with a new one as soon as possible if a crack or stain occurs.

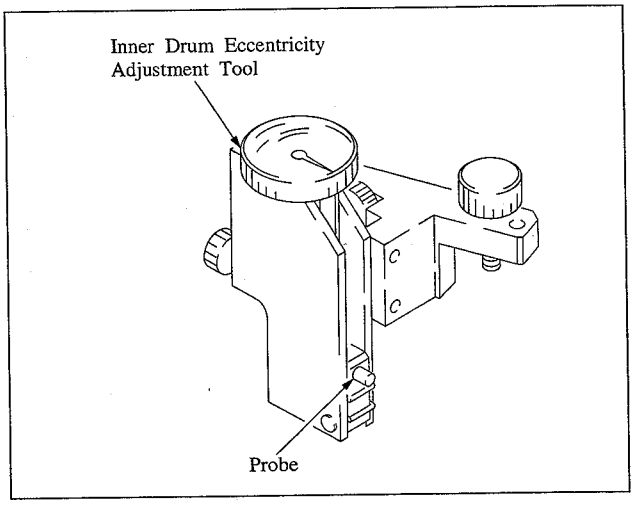


Fig. 5-4-1. Inner Drum Eccentricity Adjustment Tool

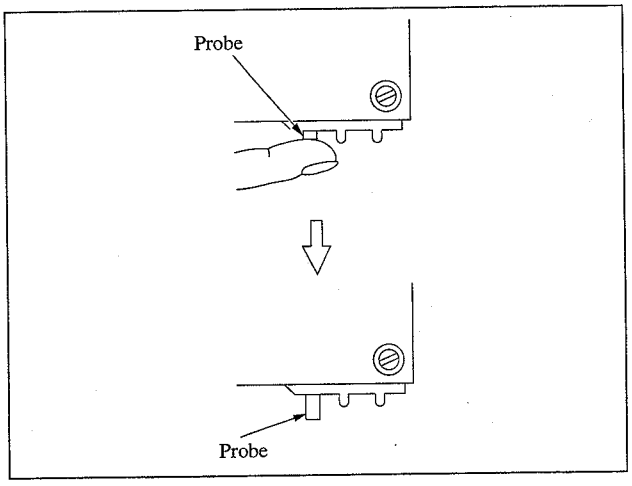


Fig. 5-4-2. Probe Check

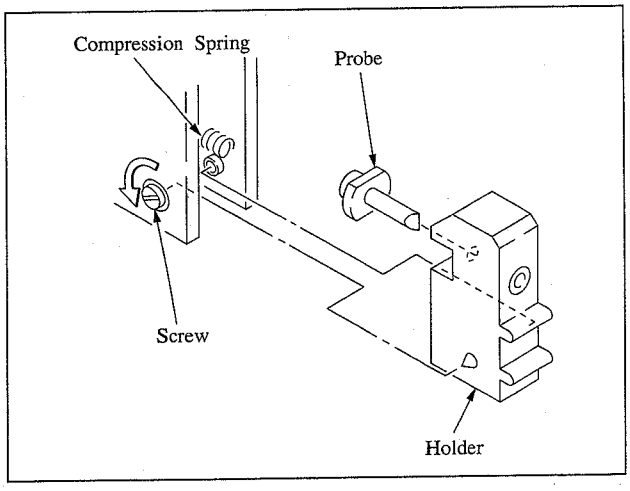


Fig. 5-4-3. Cleaning of Probe

5-4-2. Head Projection Check

1. Clean the head contact surface of a tool's probe and the Drum Ass'y before measurement.
   - Drum Ass'y cleaning: See sections 5-2-1 and 5-2-2.
   - Tool cleaning: See section 5-4-1.
2. Tool installation (Fig. 5-4-4)
   (1) Turn tool knob ① counterclockwise.
   (2) Move the dial gauge block of the tool in the direction indicated by arrow A and confirm that no clearance exists in the place shown in Fig. 1.
   (3) Move the dial gauge block in the direction indicated by arrow C while pulling knob ② in the direction of arrow B, then lock it.
   (4) Install the tool in the drum holder and tighten knob ③.

   Note: Take care that the tool does not touch the rotary head when it is installed. Also, be careful not to damage the side surface of the drum.

   (5) Rotate the zero-point adjustment knob of the tool clockwise by one or two turns.
   (6) Turn the inner drum clockwise with a finger and stop it in the position where the probe of the tool does not touch the rotary head.
   (7) Hold the dial gauge block by hand and pull knob ②in the direction indicated by arrow B.
   (8) Move the dial gauge block gently in the direction indicated by arrow E so that it strikes against the side surface of the drum.

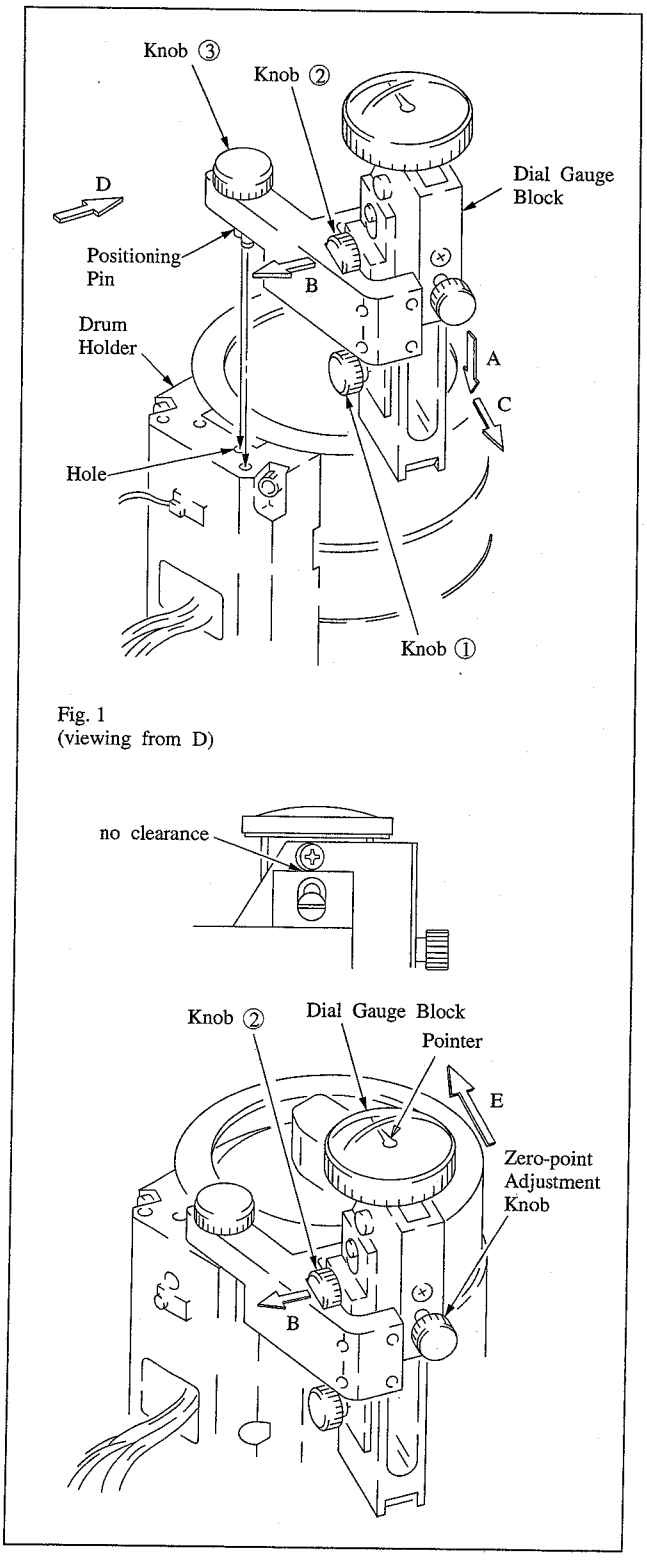


Fig. 5-4-4. Installing of Inner Drum Eccentricity Adjustment Tool

3. Confirmation of tool and head contact surface (Fig. 5-4-5)
   (1) Confirm that two ribs touch the side surface of the lower drum as shown in the figure.
   (2) Turn the zero-point adjustment knob counterclockwise so that the probe strikes against the side surface of the lower drum.
   Confirm that the clearance between the probe and upper drum's lower edge shown in the figure satisfies the specification.

   Specification: 0.1 to 0.2 mm (when viewed visually)

   If the specification is not satisfied, repeat steps 2 and later.

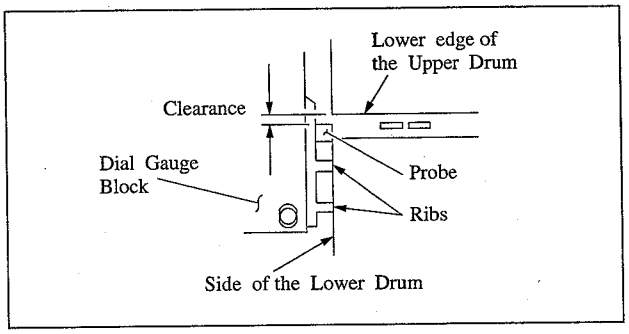


Fig. 5-4-5. Confirmation of tool and head contact surface

4. Head projection check (Fig. 5-4-6)
   (1) Turn the dial gauge and adjust the pointer deflection to zero.
   (2) Rotate the inner drum slowly clockwise with a finger by one turn. If the pointer deflection does not return to zero, turn the dial gauge again and adjust the pointer to zero.

   Note: Do not turn the inner drum counterclockwise. This may damage the rotary head and probe.

   (3) Turn the inner drum slowly with a finger and measure the projection of each head.
   Confirm that the projection of all the heads is 30 μm. (Continue the measurement even if the pointer deflection does not return to zero during projection measurement.)

   Note: If the projection of a REC or PB head is less than 30 μm, replace the Inner Drum Ass'y with a new one.

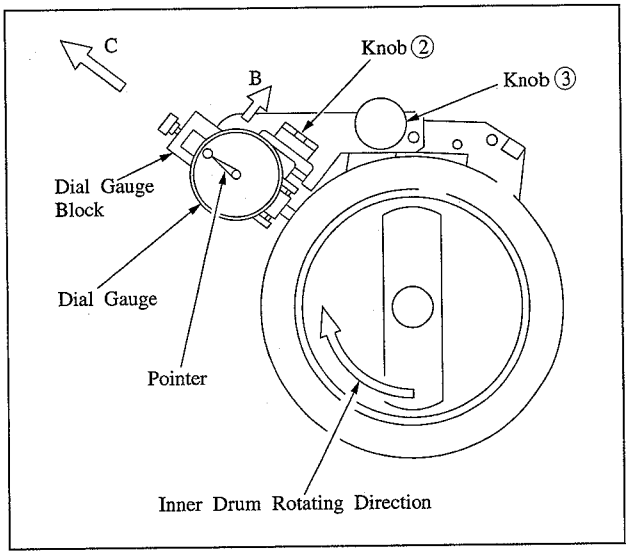


Fig. 5-4-6. Head Projection Check

5. Remove the tool in the reverse order of step 2.

   Note: Remove the tool taking care that it does not touch the drum side surface and rotary head as when installed. Also, be careful not to damage them.

5-5. GREASE SMEARING AND LUBRICATION

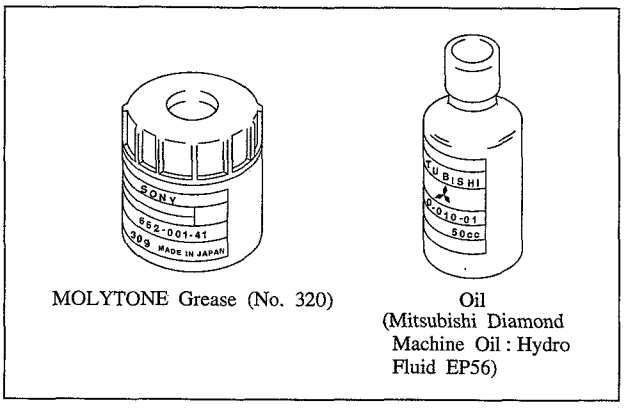
Basic Knowledge

A. The grease smearing and lubrication must be performed during periodic check to fulfill the function and performance of a machine and to lengthen the life of a machine.

B. Lubricate the following places:
   - Cassette compartment block (Fig. 5-5-2)
   - TTP block (Figs. 5-5-3 and 5-5-4)

C. Prepare the following tools:
   - MOLYTONE Grease No. 320
     Sony Part No.: 7-662-001-41
   - Oil (Mitsubishi diamond oil hydrofluid EP56)
     Sony Part No.: 7-661-018-18 or the equivalent

D. Do not smear grease or oil to those except the specified place. Grease or oil scatters when a machine is activated. This may cause the trouble that the machine malfunctions or the tape cannot be used.



MOLYTONE Grease (No. 320)

Oil
(Mitsubishi Diamond Machine Oil : Hydro Fluid EP56)

Fig. 5-5-1. MOLYTONE Grase and Oil

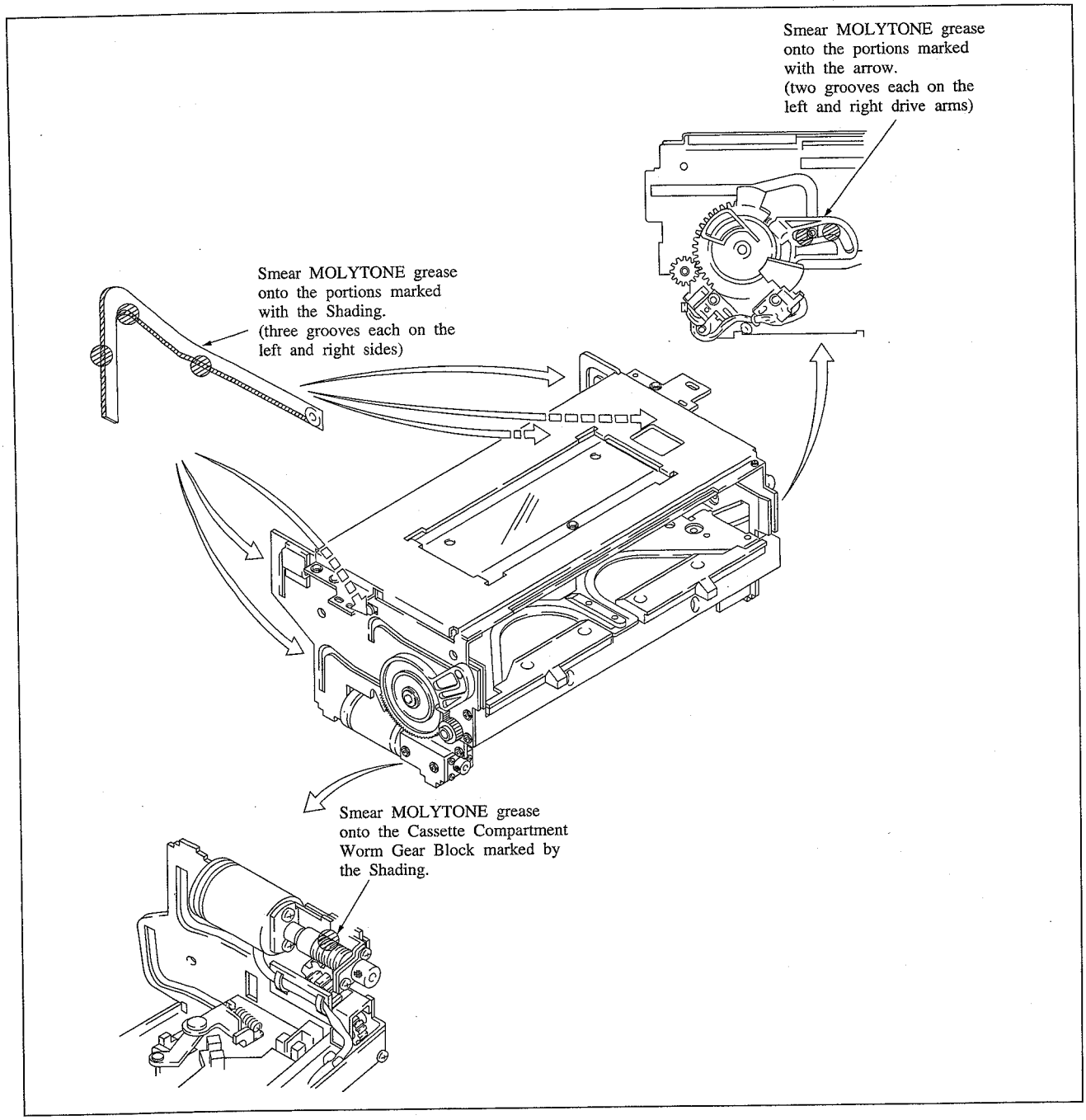


Fig. 5-5-2. Grease Smearing of Cassette Compartment Block

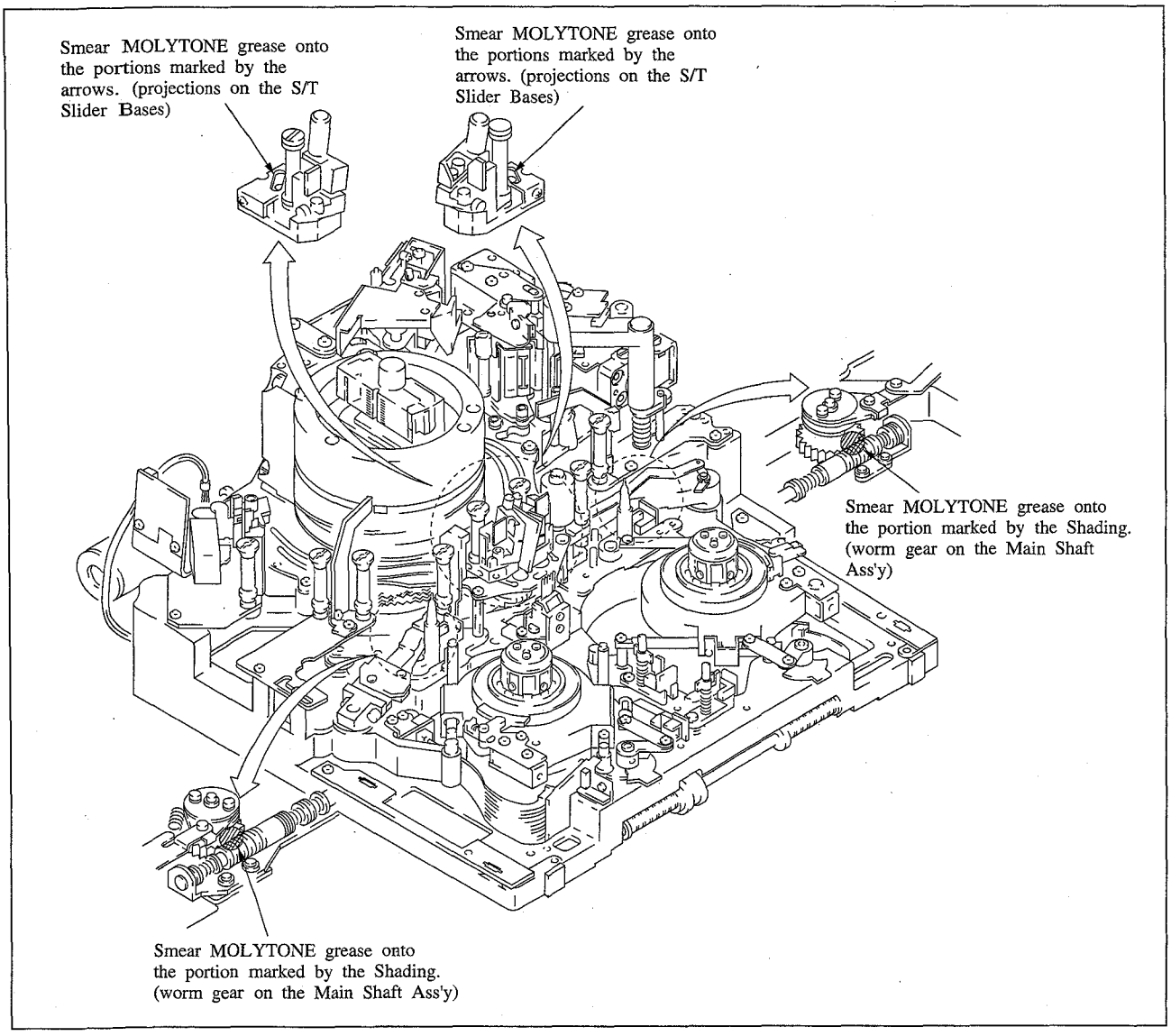


Fig. 5-5-3. Grease Smearing and Lubrication of TTP Block (1)

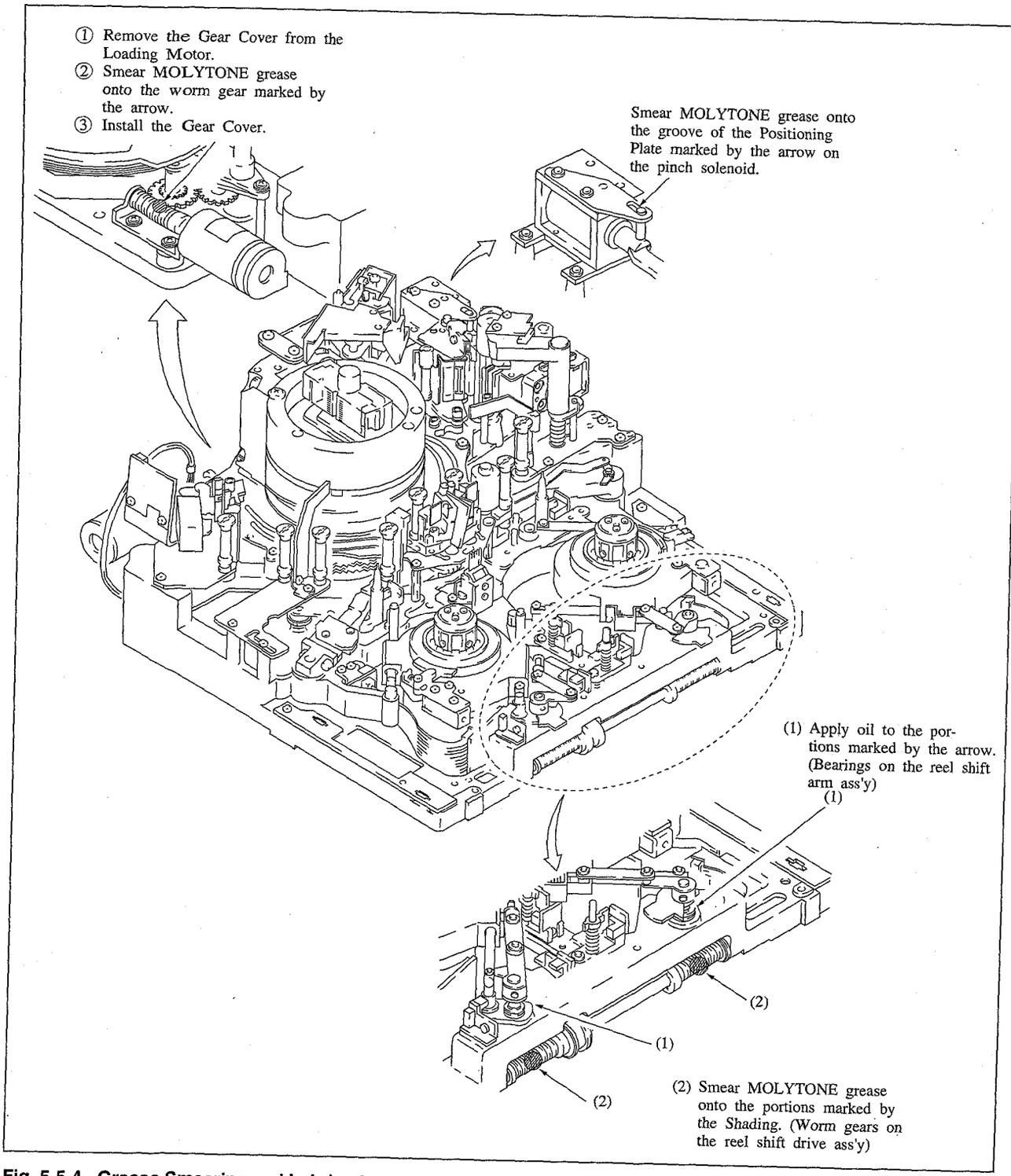


Fig. 5-5-4. Grease Smearing and Lubrication of TTP Block (2)

SECTION 6
PART REPLACEMENT

6-1. GENERAL INFORMATION FOR PART REPLACEMENT

6-1-1. Preparation before Part Replacement

1. Replace the tape transport (TTP) part in accordance with the procedure below:
   (1) Turn the power off.
   (2) Remove the top panel and side panel.
   (For removal, refer to Section 2.)
   (3) Remove the Cassette Compartment.
   Refer to section 6-2, "Replacement of Cassette Compartment Ass'y".

6-1-2. Use of Tool

1. Caution before use
   Clean the surface of the tool used for mechanical adjustment with cleaning fluid before use. Confirm that no oily component is left on the tool surface during tape transport path adjustment.
   • Cleaning fluid (or the equivalent)
   Sony part No.: 9-919-573-00

2. Tool storage
   Clean the surface of the tool with cleaning fluid after use. After that, smear rustresistant oil slightly to it, then store.
   • Oil
   Sony part No.: 7-661-018-18

3. Flaw in tool
   Remove the convex portion of the flawed surface using an oilstone (with finer particle). No accurate adjustment can be performed if a tool is used with the convex portion left. Be careful not to damage the tool.

6-1-3. How to Enter Threading End/Unthreading End State by Manual Operation

1. Threading end state
   Turn the worm gear of the loading motor shown in Fig. 6-1 in the direction indicated by arrow A.

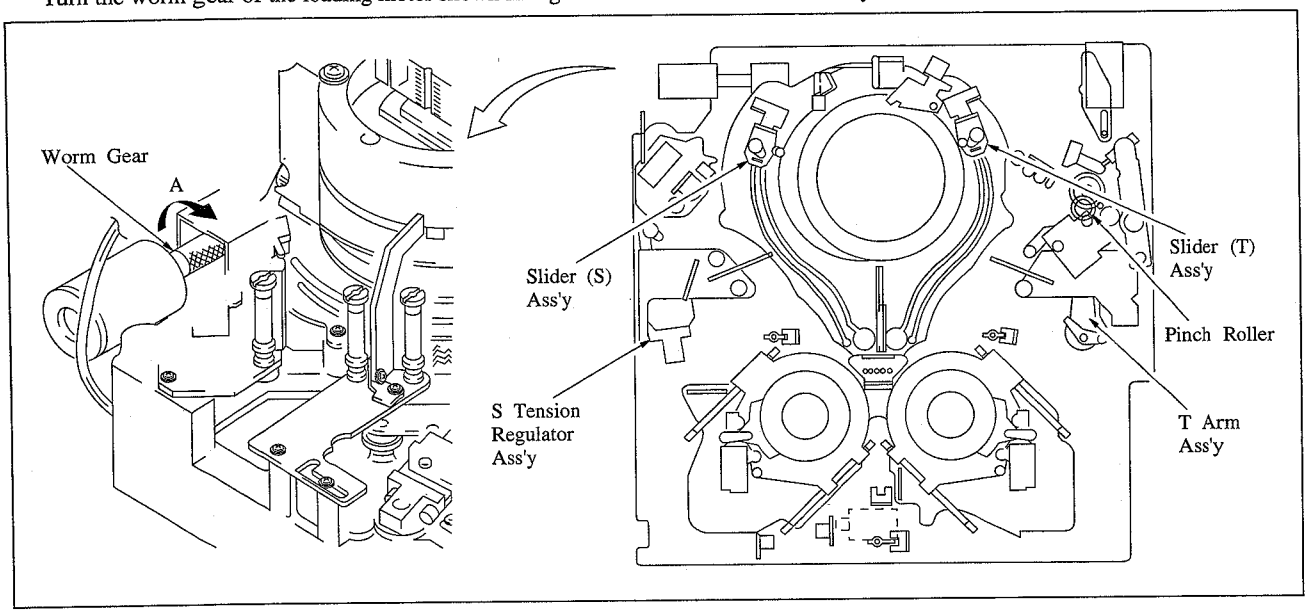


Fig.6-1-1 How To Enter Threading End State by Manual Operation

2. Unthreading end state
   Turn the worm gear of the loading motor in the direction indicated by arrow B.

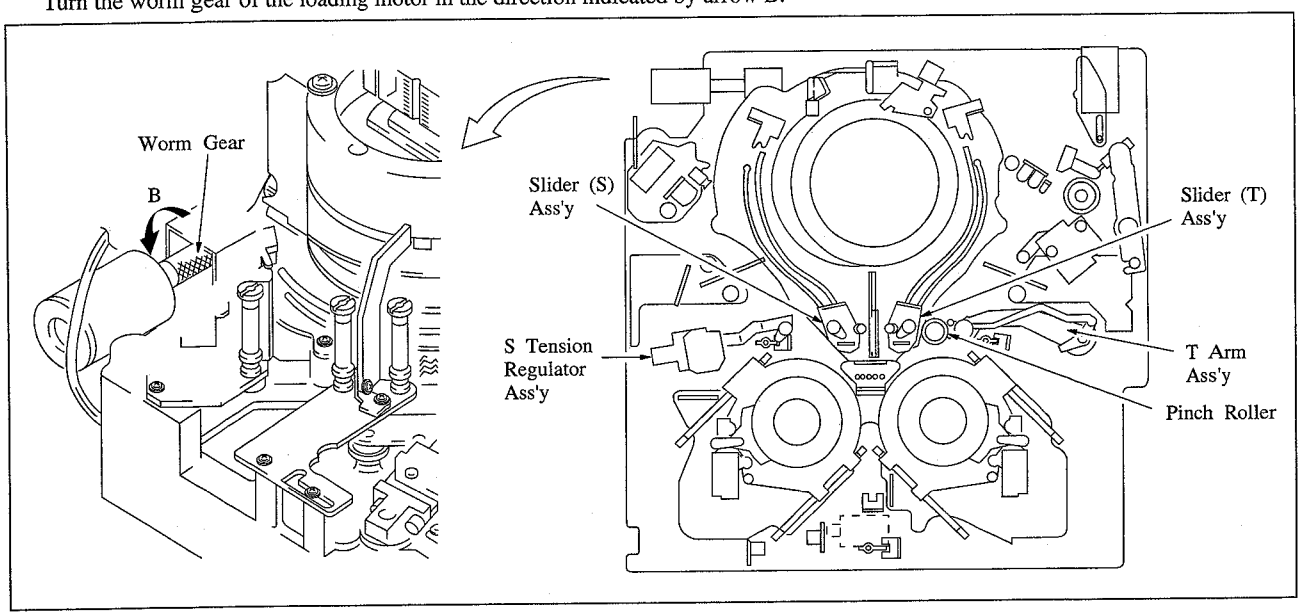


Fig.6-1-2 How To Enter Unthreading End State by Manual Operation

6-1-4. How to Set Reel Table to S/M Cassette Position by Manual Operation

1. S cassette position
   Turn the timing pulley shown in Fig. 6-2 in the direction indicated by arrow A.

When the timing pulley is rotated in the direction of arrow A, the S and T reel tables move along the shift shaft to reduce the span.

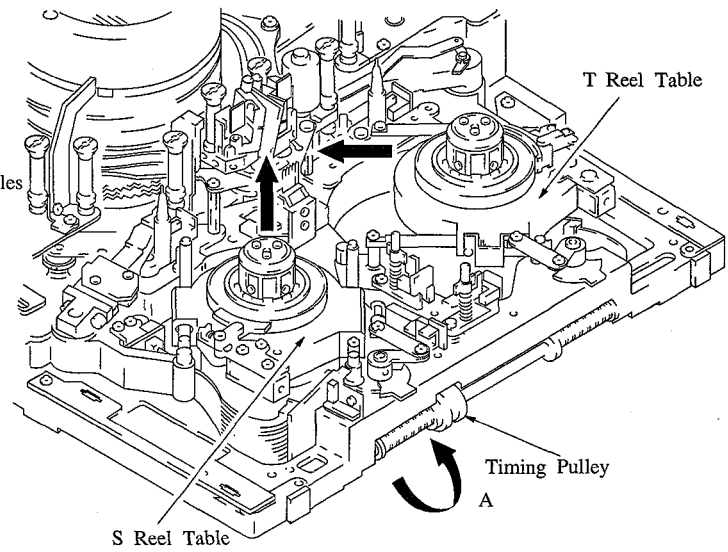


Fig.6-1-3 How To Set Reel Table S Cassette Position by Manual Operation

2. M cassette position
   Turn the timing pulley in the direction indicated by arrow B.

When the timing pulley is rotated in the direction of arrow B, the S and T reel tables move along the shift shaft to reduce the span.

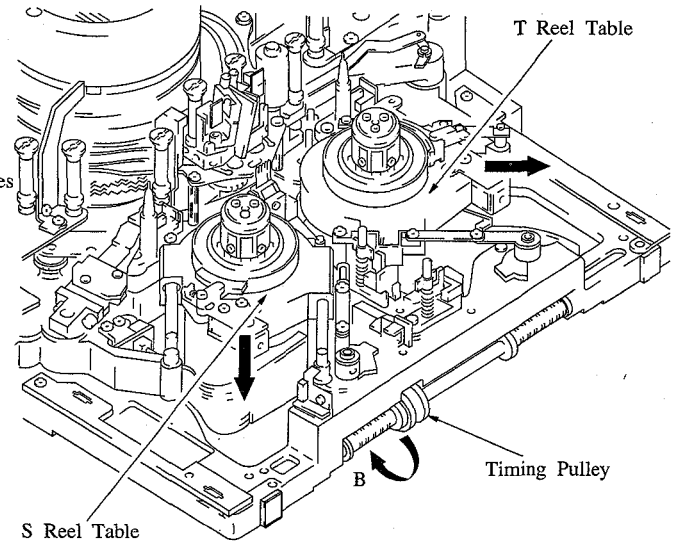
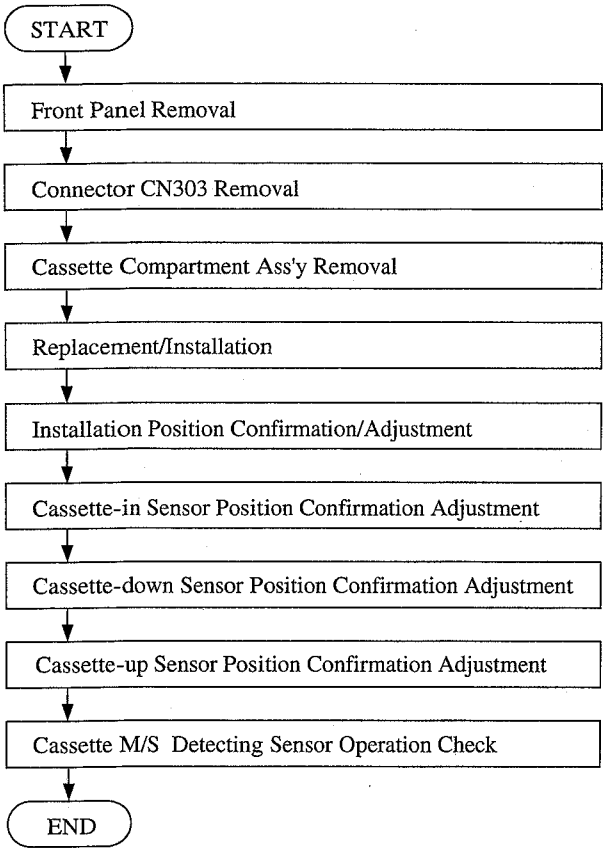


Fig.6-1-4 How To Set Reel Table M Cassette Position by Manual Operation

6-2. REPLACEMENT OF CASSETTE COMPARTMENT ASS'Y

Basic Knowledge

A. The replacement flowchart is shown below.



B. Confirm the installation position when the component part of the Cassette Compartment Ass'y is replaced. Perform each adjustment below as required.

C. Prepare the following tools:
- Thickness Gauge
  Sony Part No.: J-6041-670-A
- Wire Gauge
  Sony Part No.: J-6152-450-A
- Blank Cassette Tape
  DCS series cassette tape
- Locking compound

D. Each confirmation and adjustment are required when the Cassette Compartment Ass'y is replaced. No adjustment is required when only the Cassette Compartment Ass'y is removed or installed during other part replacement.

E. Confirmation and adjustment of each position are performed on the control panel while observing the indication on the display.
- Key operations and the indication on the display depend on the control panel being used.
- Operation of control panel BKDV-101 and BKDV-200/201. Procedure for each control panel is described from Item 6.

Replacement

1. Remove the front panel. (Refer to section 2-.)
2. Remove connector CN303 on the CN-169 board.
3. Remove two of screw ① (PSW 4x10), then remove the Cassette Compartment. (Fig. 6-2-1)
   Note: Do not hold the front portion of the Cassette Compartment Ass'y when it is removed.
4. Put the right and left feet (two each) of a new Cassette Compartment Ass'y into the holes of position adjustment plates (R) and (L).
5. Install the Cassette Compartment in the reverse order of steps 1 through 3.

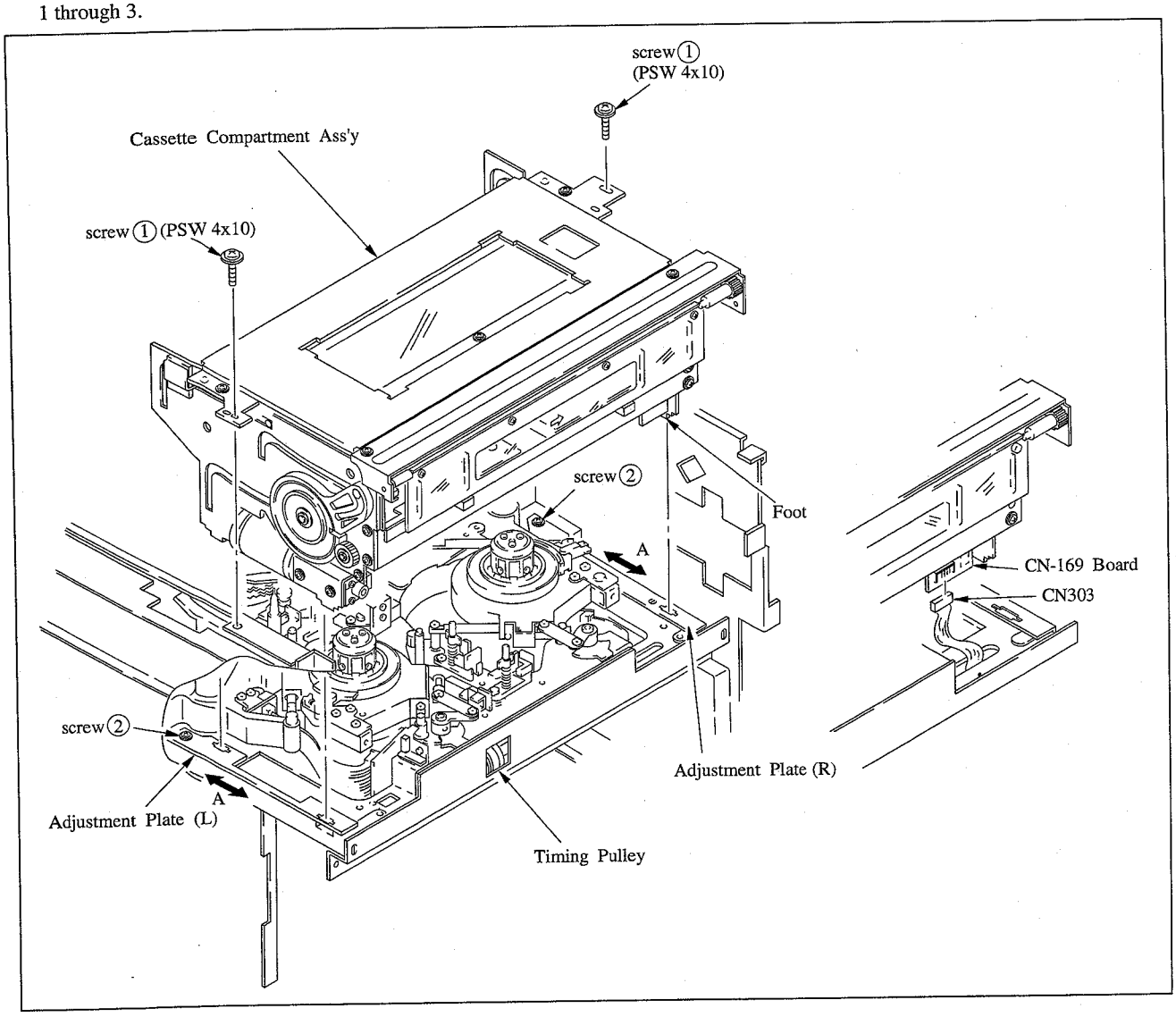


Fig.6-2-1 Cassette Compartment Ass'y Replacement

6. Installation position confirmation
   (1) Set the reel table to the S cassette position. (Refer to section 6-1-4.)
   (2) Operate the keys on the control panel in the following sequence to set the test mode for the cassette compartment.

   [BKDV-101] (Fig. 6-2-2. a)

   TEST , F6 (CHECKER), F1 (SP), F6 (F), 2 , 2 , SET

   [BKDV-200 / 201] (Fig. 6-2-2. b)

   Press SET UP , and select the checker mode menu with ∧ key or the dial while pressing the cursor enter key. Press > and then ∧ .
   INPUT CHECK + 5 (F) , 2 , 2 , SET

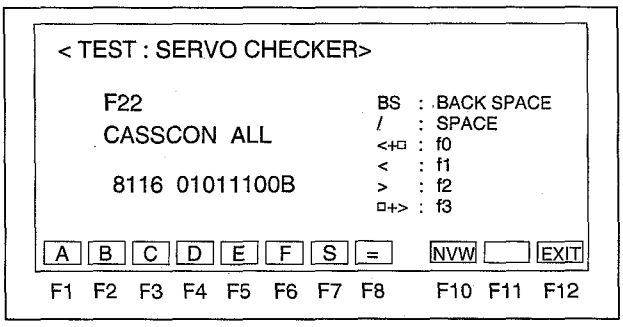


Fig.6-2-2. a Indication on the EL panel

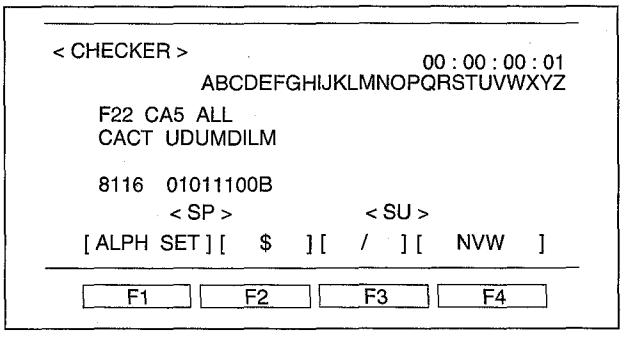


Fig.6-2-2. b Indication on the EL panel

   (3) Insert the small cassette until it strikes against the stopper, then hold.
   (4) Press the < key on the control panel to lower the cassette.
   (5) Confirm that the clearance between the stopper's bending portion and small cassette meets the specification below. (Fig. 6-2-3)
   Specification: •A thickness gauge of 0.2 mm dia. passes through the clearance.
   •A thickness gauge of 0.4 mm dia. does not pass through the clearance.
   If the specification is met, perform steps 7-(6) and later.
   If not, perform steps 7-(1) and later.

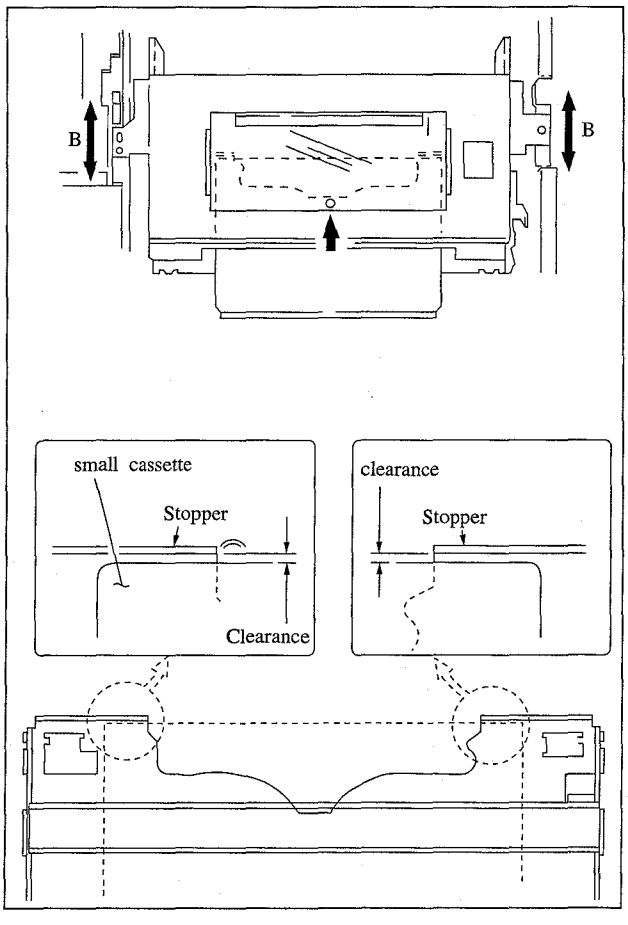


Fig.6-2-3 Installation Position Confimation/Adjustment

7. Installation position adjustment
   (1) Loosen screws ② of position adjustment plates (L) and (R) shown in Fig. 6-2-1 and move the position adjustment plates in the direction indicated by arrow A.
   (2) Loosen two of screw ① (Fig. 6-2-1)
   (3) Move the Cassette Compartment Ass'y in the direction indicated by arrow B so that the clearance between the stopper and small cassette meets the specification in step 6-(5). (Fig. 6-2-3)
   (4) Tighten two of screw ① and fix the Cassette Compartment Ass'y.
   (5) Tighten two of screw ② and fix position adjustment plates (L) and (R).
   (6) Press the keys on the control panel in the order below.

   [BKDV-101]

   [F6] (F), [1], [0], [SET]
   TEST MODE OFF

   [BKDV-200 / 201]

   [INPUT CHECK] + [5] (F), [1], [0], [SET]
   TEST MODE OFF

   The home menu is returned from the test mode
   (7) Press the EJECT button to take out the small cassette.
   (8) Insert the small cassette again and confirm that the specification in step 6 is met. If it is not, repeat steps 6 and later.
   (9) If it is met, take out the small cassette.

8. Cassette-in switch position confirmation/adjustment
   (1) Operate the keys on the control panel in the following sequence to set the test mode for the cassette compartment.

[BKDV-101] (Fig. 6-2-4. a)

[TEST], [F6] (CHECKER), [F1] (SP), [F6] (F), [2], [2], [SET]

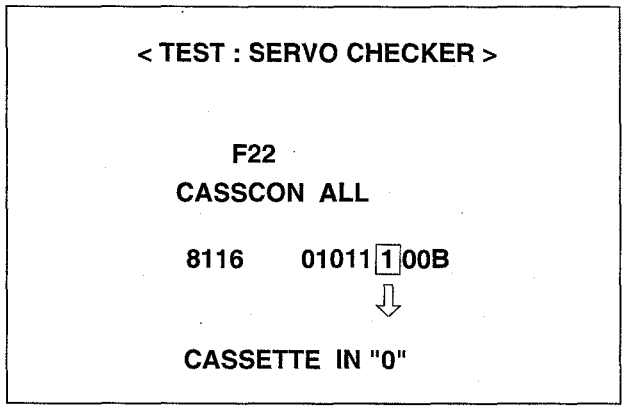


Fig.6-2-4. a Indication on the EL panel

[BKDV-200 / 201] (Fig. 6-2-4. b)

Press [SET UP], and select the checker mode menu with [∧] key or the dial while pressing the cursor enter key. Press [>] and then [∧].
[INPUT CHECK] + [5] (F), [2], [2], [SET]

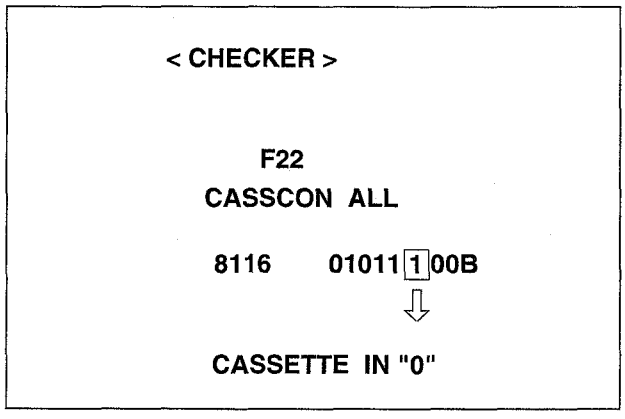


Fig.6-2-4. b Indication on the EL panel

(2) Remove the sun roof fixing screw, then remove the sun roof. (Fig. 6-2-5)
(3) Insert a small cassette.
(4) Insert a thickness gauge between the cassette stopper and small cassette. Confirm that the specification below is met at that time.
Specification: The bit display on the screenappears as follows:

Thickness gauge	Bit display
1.0 mm	"0"
1.5 mm	"1"

If it is met, perform step (13). If not, perform steps (5) and later.
(5) Insert a thickness gauge of 1.25 mm dia. between the cassette stopper and small cassette.
(6) Press the [<] key on the control panel and move the small cassette to the position where it is clamped using a cassette press plate.(Movement: Approximately 15 mm from the cassette-in position)
(7) Loosen screw ① shown in Fig. 6-2-5, move the IN-detection shutter adjustment plate in the direction indicated by arrow C, and adjust it so that the bit display on the screen changes from "1" to "0".
(8) Tighten screw ① while holding the cassette.
(9) Press the [>] key on the control panel to take out the cassette.
(10) Repeat step (4) and confirm that the specification is met. If it is not, repeat steps (5) and later.
(11) Smear locking compound to screw ① after adjustment is completed.
(12) Install the sun roof.
(13) Press the keys on the control panel in the order below:

[BKDV-101]

[F6](F),[1],[0],[SET]
TEST MODE OFF

[BKDV-200 / 201]

[INPUT CHECK]+[5],[1],[0],[SET]
TEST MODE OFF

The home menu is returned from the test mode.

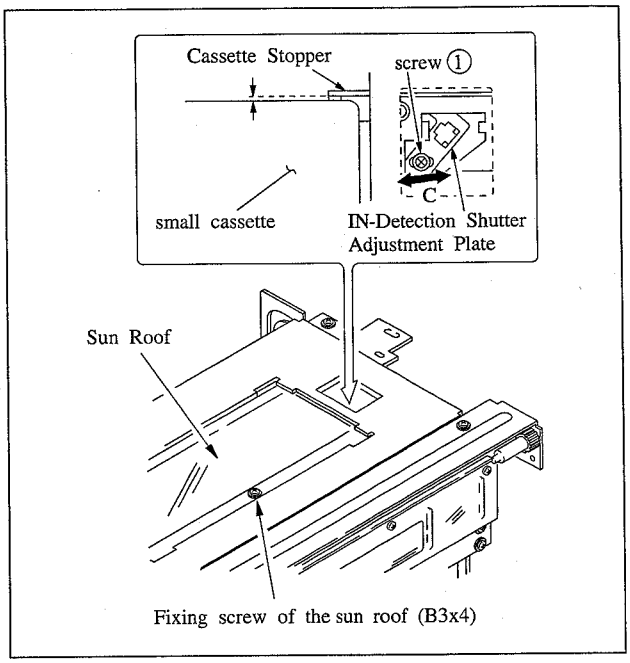


Fig.6-2-5 Cassette-in Switch Position Adjustment

9. Cassette-down sensor position confirmation/adjustment

(1) Operate the keys on the control panel in the following sequence to set the test mode for the cassette compartment.

[BKDV-101] (Fig. 6-2-6. a)

[TEST], [F6] (CHECKER), [F1] (SP), [F6] (F), [2], [2], [SET]

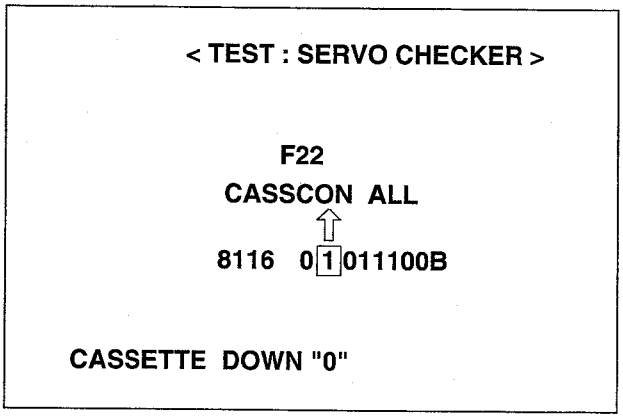


Fig.6-2-6. a Indication on the EL panel

[BKDV-200 / 201] (Fig. 6-2-6. b)

Press [SET UP], and select the checker mode menu with [∧] key or the dial while pressing the cursor enter key. Press [>] and then [∧].
[INPUT CHECK] + [5] (F), [2], [2], [SET]

(2) Press the [<] key on the control panel to lower the compartment.

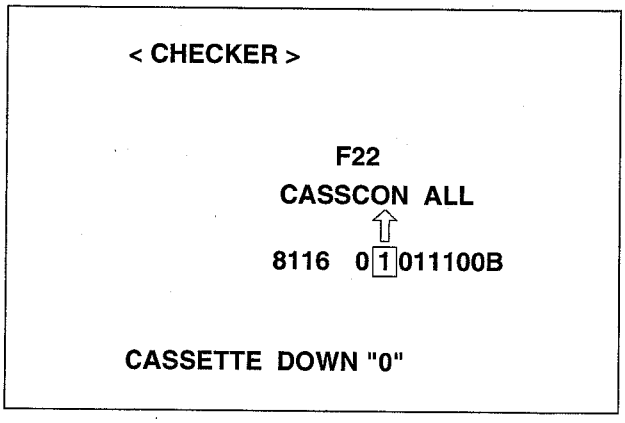


Fig.6-2-6. b Indication on the EL panel

(3) Turn the wheel in the direction indicated by arrow B (counterclockwise) and raise the roller block from the reference position by 1 to 2 mm. (Fig. 6-2-7)
(4) Turn the wheel in the direction indicated by arrow A (clockwise) and lower the roller block of the compartment from the reference position by 0.5 mm (using a thickness gauge).
(5) Then, rotate the wheel slowly in the direction indicated by arrow A by 1/2 turn. Confirm that the specification below is met at that time.
Specification: The bit display on the screen shown in the figure appears as follows:Confirm that the bit display changes from "1" to "0"
If it is met, perform step (15). If not, perform steps (6) and later.
(6) Remove the R panel of the machine.
(7) Turn the wheel in the direction indicated by arrow B (counterclockwise) and raise the roller block from the reference position by 1 to 2 mm.
(8) Turn the wheel in the direction indicated by arrow A and lower the compartment from the reference position by 0. 5 mm (using a thickness gauge).
(9) Then, rotate the wheel from the position in step (8) in the direction of arrow A by 1/4 turn.
(10) Loosen screw ① by 1/2 to one turn and move the sensor bracket in the direction indicated by arrow D until the specification is met.
(11) Tighten screw ①.
(12) Perform steps (2) through (5) and confirm that the specification is met. If it is not, repeat steps (7) through (11).
(13) Smear locking compound to screw ① after adjustment is completed.
(14) Install the R panel.
(15) Press the keys on the control panel in the order below:

[BKDV-101]

[F6](F),[1],[0],[SET]
TEST MODE OFF

[BKDV-200 / 201]

[INPUT CHECK]+[5],[1],[0],[SET]
TEST MODE OFF

The home menu is returned from the test mode.

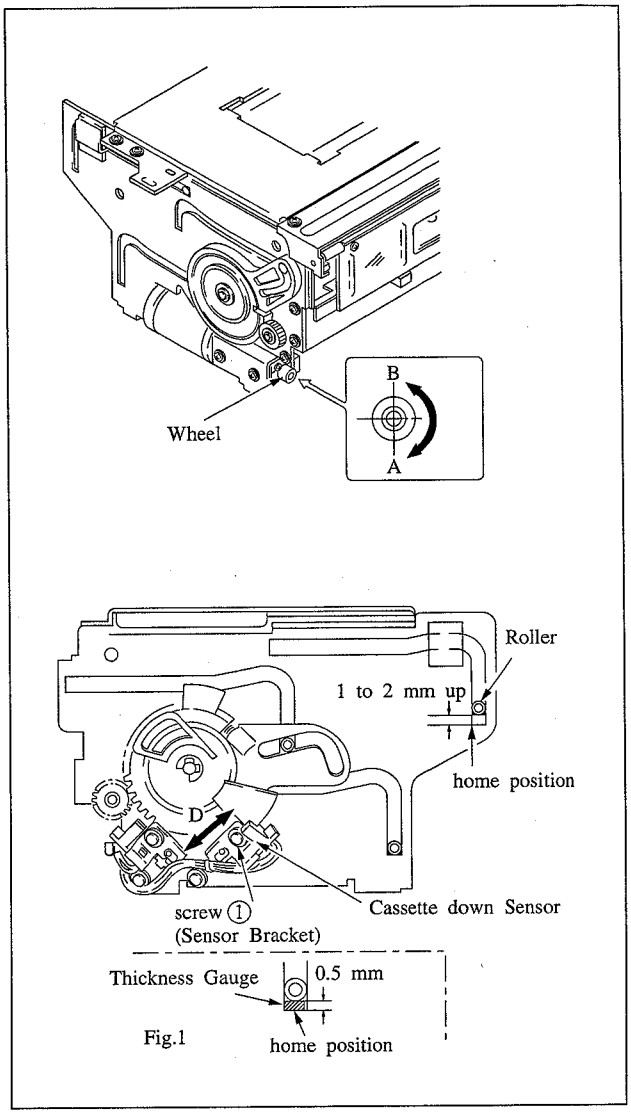


Fig.6-2-7 Cassette-down Sensor Position Adjustment

10. Cassette-up sensor position adjustment

(1) Operate the keys on the control panel in the following sequence to set the test mode for the cassette compartment.

[BKDV-101] (Fig. 6-2-8. a)

[TEST], [F6] (CHECKER), [F1] (SP), [F6] (F), [2], [2], [SET]

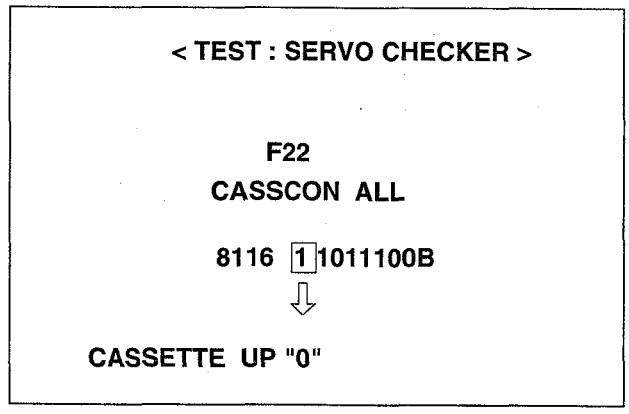


Fig.6-2-8. a Indication on the EL panel

[BKDV-200 / 201] (Fig. 6-2-8. b)

Press [SET UP], and select the checker mode menu with [∧] key or the dial while pressing the cursor enter key. Press [>] and then [∧].
[INPUT CHECK] + [5] (F), [2], [2], [SET]

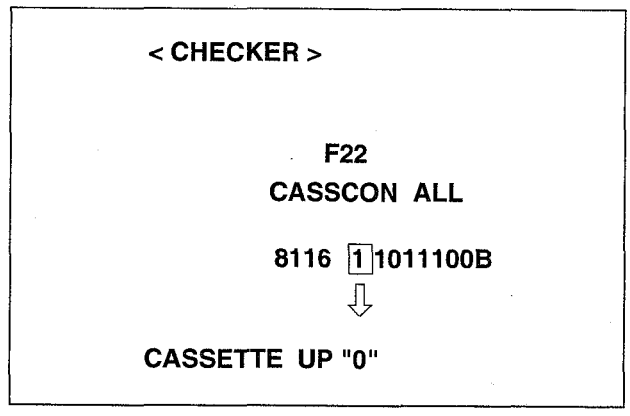


Fig.6-2-8. b Indication on the EL panel

(2) Turn the wheel in the direction indicated by arrow A (clockwise)(Fig. 6-2-9) and make the rubber surface lower than the reference surface of the cassette press plate.
(3) Turn the wheel in the direction indicated by arrow B (counterclockwise) and make the reference surface coincide with the rubber surface (the lowest one among the four press rubbers).
(4) Then, rotate the wheel in the direction indicated by arrow B by 1/2 return. Confirm that the specification below is met at that time.
Specification: The bit display on the screen shown in the figure appears as follows:Confirm that the bit display changes from "1" to "0".
If the specification is met, perform step (13). If not, perform steps (5) and later.
(5) Remove the R panel of the machine.
(6) Make the rubber surface (the highest one among the four press rubbers) coincide with the reference surface of the cassette press plate.
Note: Align the rubber surface with the reference surface in the direction in which it is brought down then pulled up.
(7) Then, rotate the wheel in the direction indicated by arrow B by 1/4 turn.

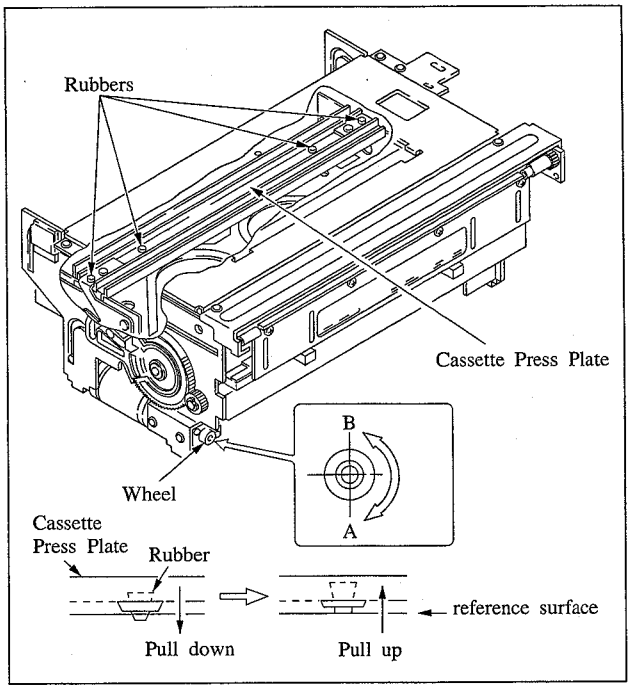


Fig.6-2-9 Cassette-up Sensor Position Adjustment (1)

(8) Loosen screw ① by 1/2 to one turn and move the sensor bracket in the direction indicated by arrow E until the specification is met.
(9) Tighten screw ①.
(10) Perform steps (2) through (4) and confirm that the specification is met. If it is not, repeat steps (5) through (9).
(11) Smear locking compound to screw ① after adjustment is completed.
(12) Install the R panel.
(13) Press the keys on the control panel in the order below:

[BKDV-101]

F6 (F), 1 , 0 , SET
TEST MODE OFF

[BKDV-200 / 201]

INPUT CHECK + 5 , 1 , 0 , SET
TEST MODE OFF

The home menu is returned from the test mode.

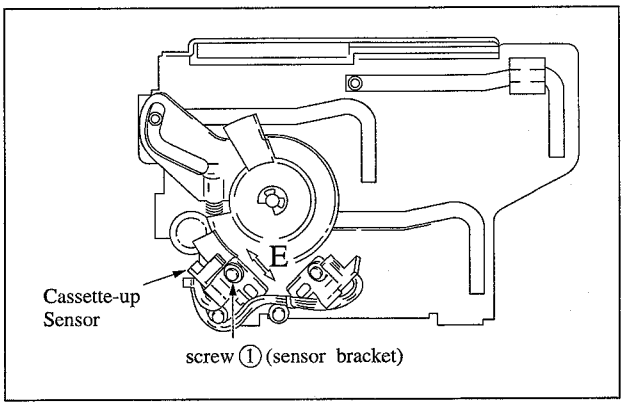


Fig.6-2-10 Cassette-up Sensor Position Adjustment (2)

11. Cassette M/S Detecting Sensor operation check

(1) Operate the keys on the control panel in the following sequence to set the test mode for the cassette compartment.

[BKDV-101] (Fig. 6-2-11. a)

[TEST], [F6] (CHECKER), [F1] (SP), [F6] (F), [2], [2], [SET]

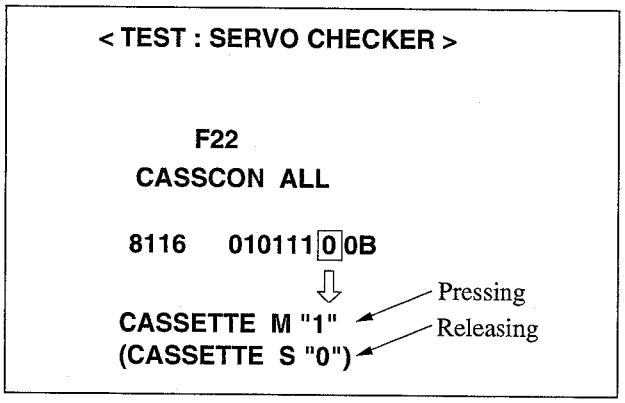


Fig.6-2-11. a Indication on the EL panel

[BKDV-200 / 201] (Fig. 6-2-11. b)

Press [SET UP], and select the checker mode menu with [∧] key or the dial while pressing the cursor enter key. Press [>] and then [∧].
[INPUT CHECK] + [5] (F), [2], [2], [SET]

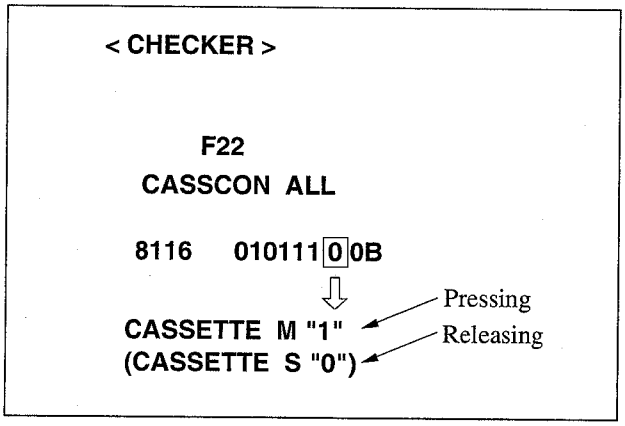


Fig.6-2-11. b Indication on the EL panel

(2) Confirm that the specification below is met when the Cassette M/S Detecting Sensor shown in Fig. 6-2-12 is pushed with a finger

Specification: The display bit on the screen shown in the figure appears as follows:
Pushed with a finger (M cassette): "1"
Released from a finger (S cassette): "0"
If the specification is met, perform step (4). If not, perform steps (4) and later.

(3) Confirm both the connection state of 4-pin flexible card wire CN303 on the CN-169 board installed in the Cassette Compartment and the Cassette M/S Detecting Sensor.

(4) Press the keys on the control panel in the order below:

[BKDV-101]

[F6] (F), [1], [0], [SET]
TEST MODE OFF

[BKDV-200 / 201]

[INPUT CHECK] + [5], [1], [0], [SET]
TEST MODE OFF

The home menu is returned from the test mode.

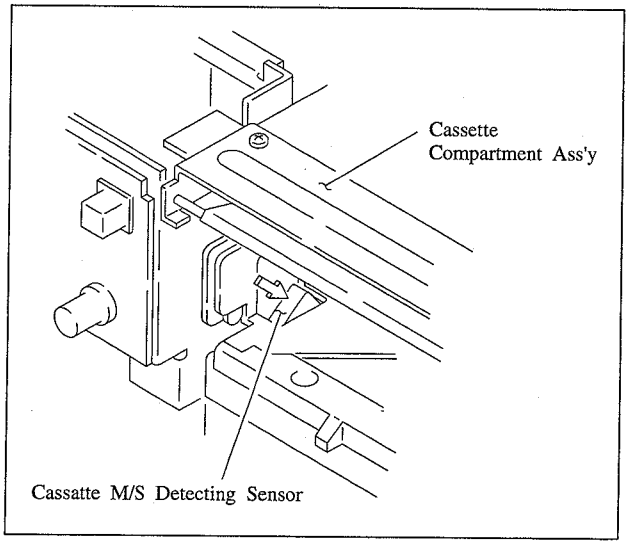


Fig.6-2-12 Cassette M/S Detecting Sensor Operation Check

6-3. CASSETTE COMPARTMENT COMPONENT REPLACEMENT

Basic Knowledge

A. This section describes the replacement of the component parts that require the adjustment when the cassette compartment component is replaced. This section describes the replacement of the component parts below. (Fig. 6-3-1)
   - 6-3-1. Cassette Compartment Motor Ass'y Component Replacement
   - 6-3-2. Synchronous Shaft Ass'y Component Replacement
   - 6-3-3. Drive Arm L/R Ass'y Replacement
   - 6-3-4. Gear 1 Replacement
   - 6-3-5. Front Lid Ass'y Component Replacement (This is not performed in DVR-C20.)

B. The component parts of the Cassette Compartment are replaced after the Cassette Compartment Ass'y is removed from the main unit (refer to section 6-2). After the component parts are installed or adjusted, install the Cassette Component and check the adjustments in section 6-2. Each adjustment is performed as required.

C. Prepare the following tools for replacement and adjustment:
   - Thickness Gauge
     Sony Part No.: J-6041-670-A
   - Wire Gauge
     Sony Part No.: J-6152-450-A
   - Molytone Grease
     Sony Part No.: 7-662-001-41 or the equivalent

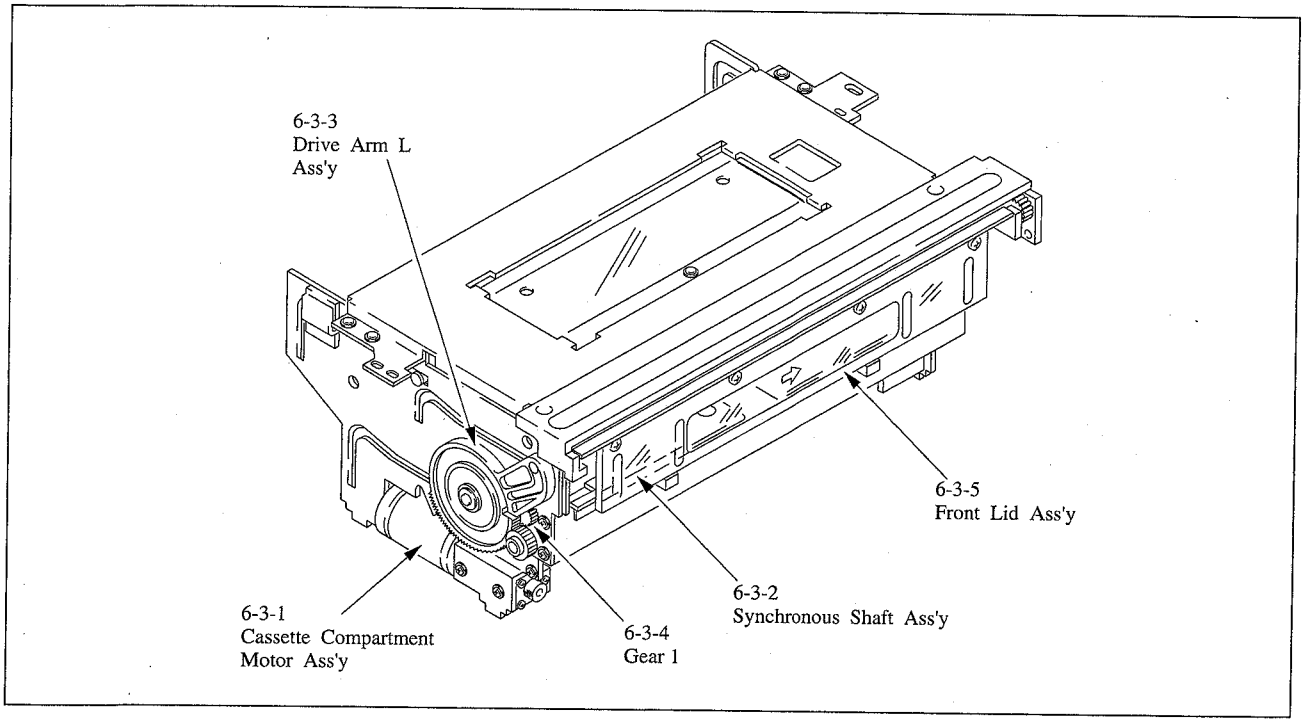
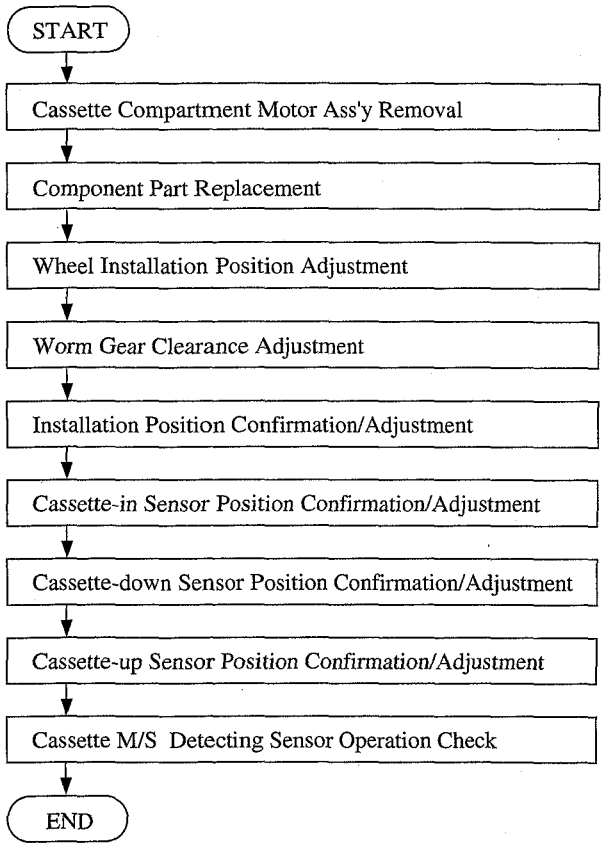


Fig. 6-3-1 Cassette Compertment Ass'y Components

6-3-1. Cassette Compartment Motor Ass'y Component Replacement

Basic Knowledge

A. Prepare the replacement referring to the basic knowledge in section 6-3 before replacement.
B. The parts that require the replacement among the component parts shown in Fig. 6-3-3 are replaced in this procedure.
C. The replacement flowchart is shown below:



Replacement

1. Turn the wheel shown in the figure clockwise and move the Cassette Compartment in the cassette-down direction by 1 to 10 mm.
2. Remove two of screw ① and the soldering at a motor pin, then remove the Cassette Compartment Motor Ass'y from the Cassette Compartment. (Fig. 6-3-2)

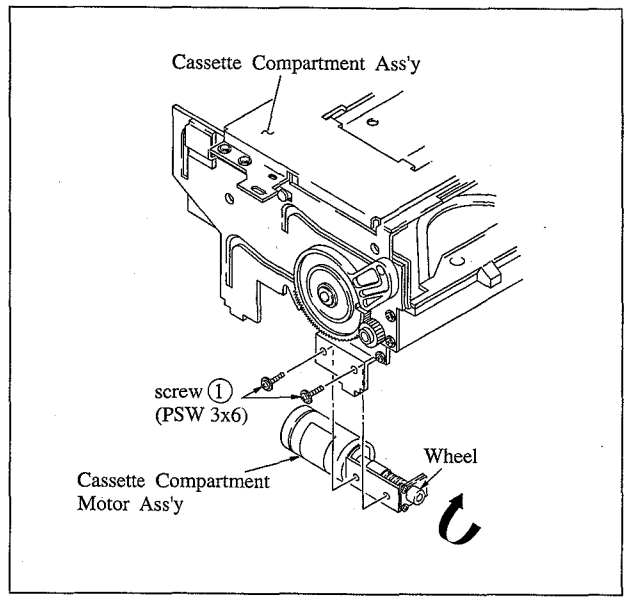


Fig. 6-3-2 Cassette Compartment Motor Ass'y Removal

3. Remove two of screw ② and divide the Cassette Compartment Motor Ass'y into a Motor Block and Worm Gear Block. (Fig. 6-3-3)
4. Replacement of component parts required
   Replace the parts that require the replacement of a Worm Gear Block (or Motor Block).

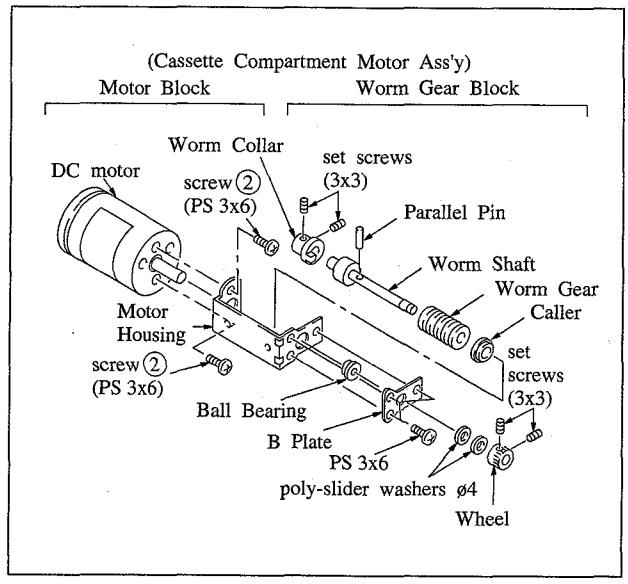


Fig. 6-3-3 Cassette Compartment Motor Ass'y Components

5. Replace the component parts of the Worm Gear Block and perform the wheel installation position adjustment below during installation. (Fig. 6-3-4)
   (1) Insert the parallel pin installed in a worm shaft into the groove of the worm gear and press it in the direction indicated by arrow A.
   (2) Put a thickness gauge of 0.25 mm dia. in diameter between the wheel and polyslider and tighten two setscrews.
   (3) Put the thickness gauges below in the above place and confirm that the specification is met.

   Specification B:
   - A thickness gauge of 0.2 mm dia. passes through the clearance.
   - A thickness gauge of 0.3 mm dia. does not pass through the clearance.If the specification is not met, repeat steps (2) and later.

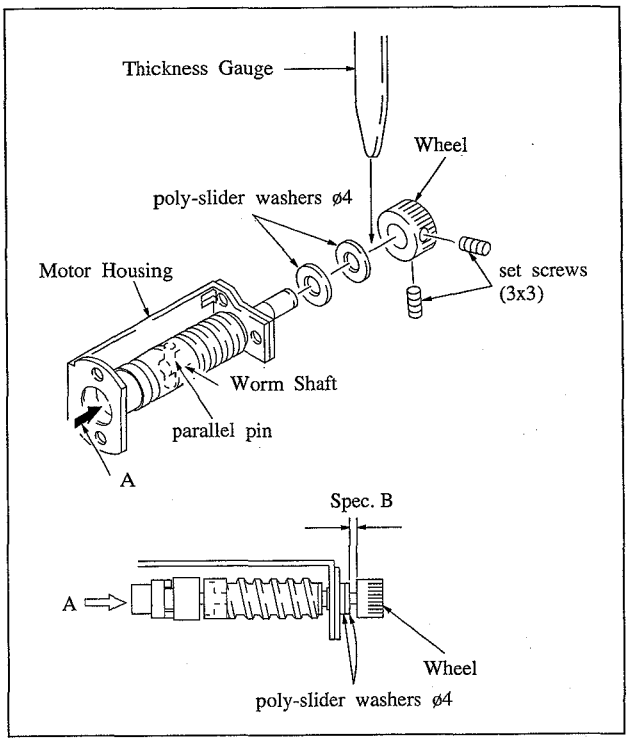


Fig. 6-3-4 Wheel Installation position Adjustment

6. Install the Motor Block in the Worm Gear Block with two of screw ②. Install the label of the motor so that it faces the outside.
7. Tighten two setscrews and fix the worm collar. In this case, make a clearance of about 0.5 mm in portion C in Fig. 6-3-5 when the wheel is pushed in the direction indecated by arrow A.
8. Install the Cassette Compartment Motor Ass'y in the Cassette Compartment with two of screw ①.

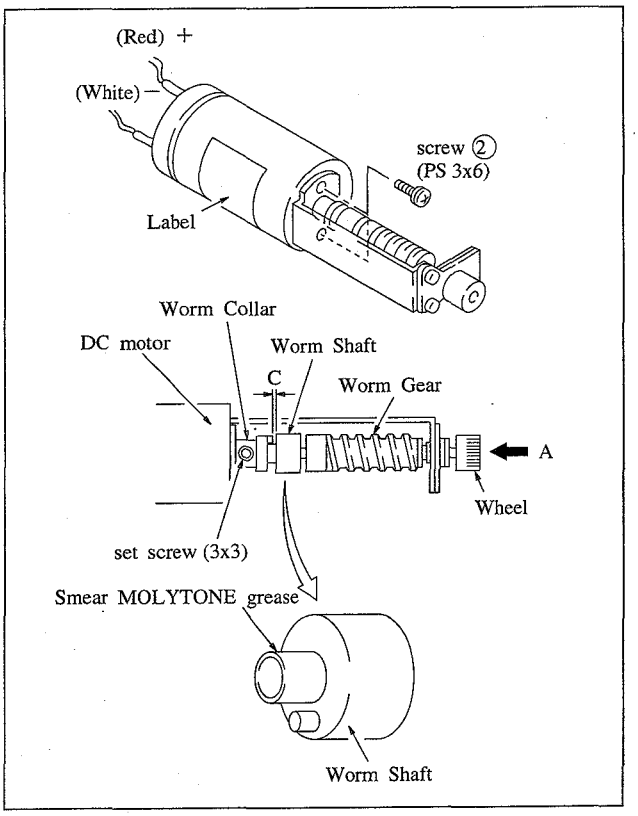


Fig. 6-3-5 Worm Gear Block Installation

9. Worm gear clearance adjustment
   (1) Insert a wire gauge of 0.4 mm dia. into the engagement portion (portion A) of the worm gear and worm wheel until it strikes against the motor housing.

   Note: Insert the wire gauge into the portion in which the trough of the worm gear is most contiguous to the crest of the worm wheel.

   (2) Press the Motor Block in the direction indicated by arrow D and tighten two screws ①.
   (3) Pull out the wire gauge of 0.4 mm dia., reinsert it into the same portion, and confirm that it is inserted smoothly.
   (4) Confirm that a wire gauge of 0.5 mm dia. cannot be inserted into the portion in step (3).
   (5) Turn the wheel in the direction indicated by arrow E and confirm portions B and C of the worm wheel in the same manner as the above.
   (6) Smear Molytone grease properly to the portion of the worm gear shown in the figure.

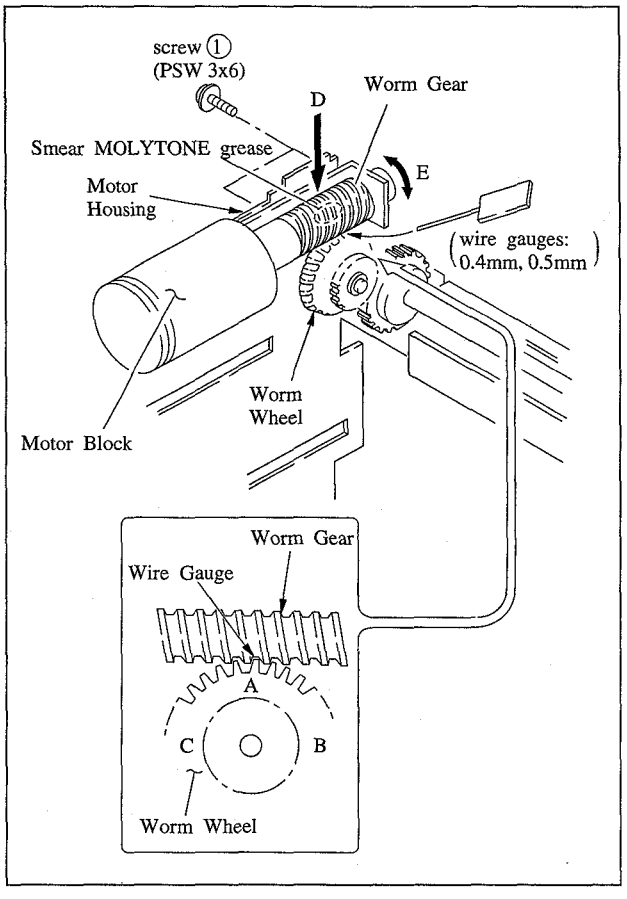


Fig. 6-3-6 Worm Gear Clearance Adjustment

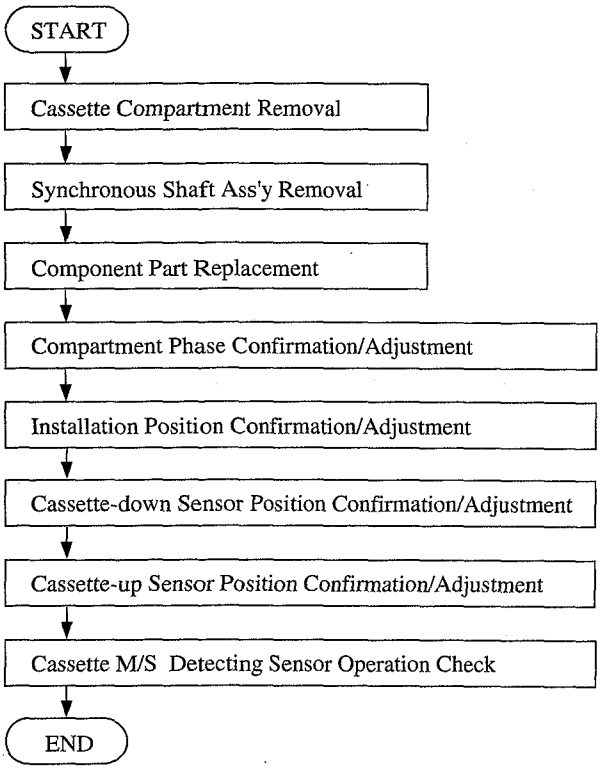
10. Install the Cassette Compartment in the machine. (Refer to section 6-2.)
11. Perform the installation position confirmation/ adjustment. (Refer to section 6-2.)
12. Perform the cassette-in sensor position confirmation/ adjustment. (Refer to section 6-2.)
13. Perform the cassette-down sensor position confirmation/ adjustment. (Refer to section 6-2.)
14. Perform the cassette-up sensor position confirmation/ adjustment. (Refer to section 6-2.)
15. Perform the cassette M/S detecting sensor operation check. (Refer to section 6-2.)

6-3-2. Synchronous Shaft Ass'y Component Replacement

Basic Knowledge

A. The replacement flowchart is shown below:

B. Read the basic knowledge in section 6-3 and prepare the required tool before replacement:



Removal/Replacement

1. Remove the Cassette Compartment from the machine. (Refer to section 6-2.)
2. Turn the wheel shown in the figure clockwise and set the compartment to the cassette-down state.

   Note: Be careful not to shorten the compression coil spring in a drive arm in this case.
3. Remove E ring ① shown in the figure, then remove the Synchronous Shaft Ass'y Component from the Cassette Component.
4. Replace the required component parts.

   Note: Smear Molytone grease properly to the bearing contact portion of the synchronous shaft during replacement.
5. Install the Synchronous Shaft Ass'y in the Cassette Compartment.

Adjustment

6. Perform the compartment phase confirmation/adjustment. (Refer to section 6-3-3.)
7. Install the Cassette Compartment in the machine. (Refer to section 6-2.)
8. Perform the installation position confirmation/adjustment. (Refer to section 6-2.)
9. Perform the cassette-in sensor position confirmation/ adjustment. (Refer to section 6-2.)
10. Perform the cassette-down sensor position confirmation/ adjustment. (Refer to section 6-2.)
11. Perform the cassette-up sensor position confirmation/ adjustment. (Refer to section 6-2.)
12. Perform the cassette M/S detecting sensor operation check. (Refer to section 6-2.)

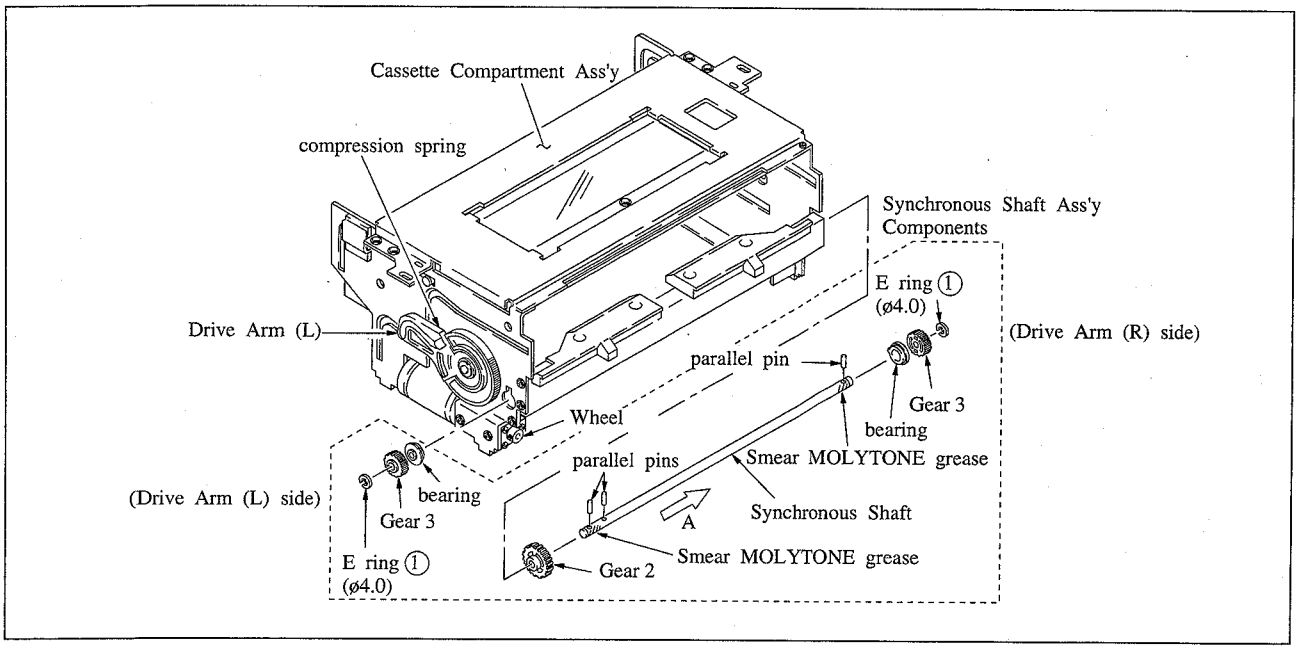
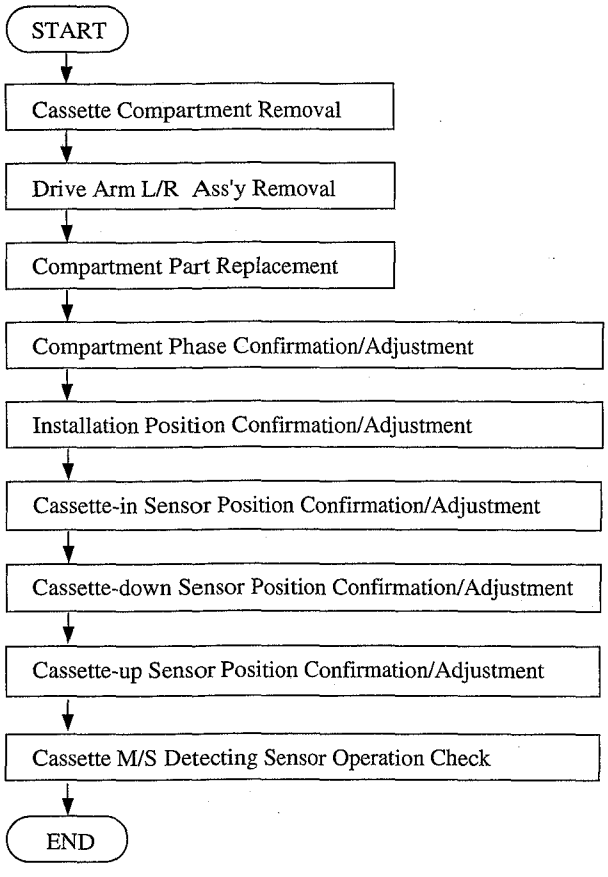


Fig. 6-3-7 Synchronous Shaft Ass'y Components

6-3-3. Drive Arm L/R Ass'y Replacement

Basic Knowledge

A. This section describes the replacement of the Drive Arm L Ass'y. The Drive Arm R Ass'y can also be replaced in the same procedure as the above.
B. Read the basic knowledge in section 6-3 and prepare the required tool before replacement.
C. The replacement flowchart is shown below:



Removal/Replacement

1. Remove the Cassette Compartment from the machine. (Refer to section 6-2.)
2. Turn the wheel shown in the figure clockwise and move the compartment in the cassette-down direction by 1 to 10 mm.
3. Remove E ring q shown in the figure, then remove the Drive Arm L Ass'y (or Drive Arm R Ass'y).
4. Replace the required component parts.

Installation/Adjustment

5. Drive Arm L/R Ass'y Installation
   (1) Clean the drive arm L/R fixing shaft with cloth (or gauze) moistened with cleaning fluid.
   (2) Confirm that no foreign matter attaches to the contact surface of the fixing shaft and Drive Arm L/R Ass'y.
   (3) Smear Molytone grease properly to the side of the fixing shaft.
   (4) Install the Drive Arm L Ass'y (or Drive Arm R Ass'y) in the Cassette Compartment using an E ring ①

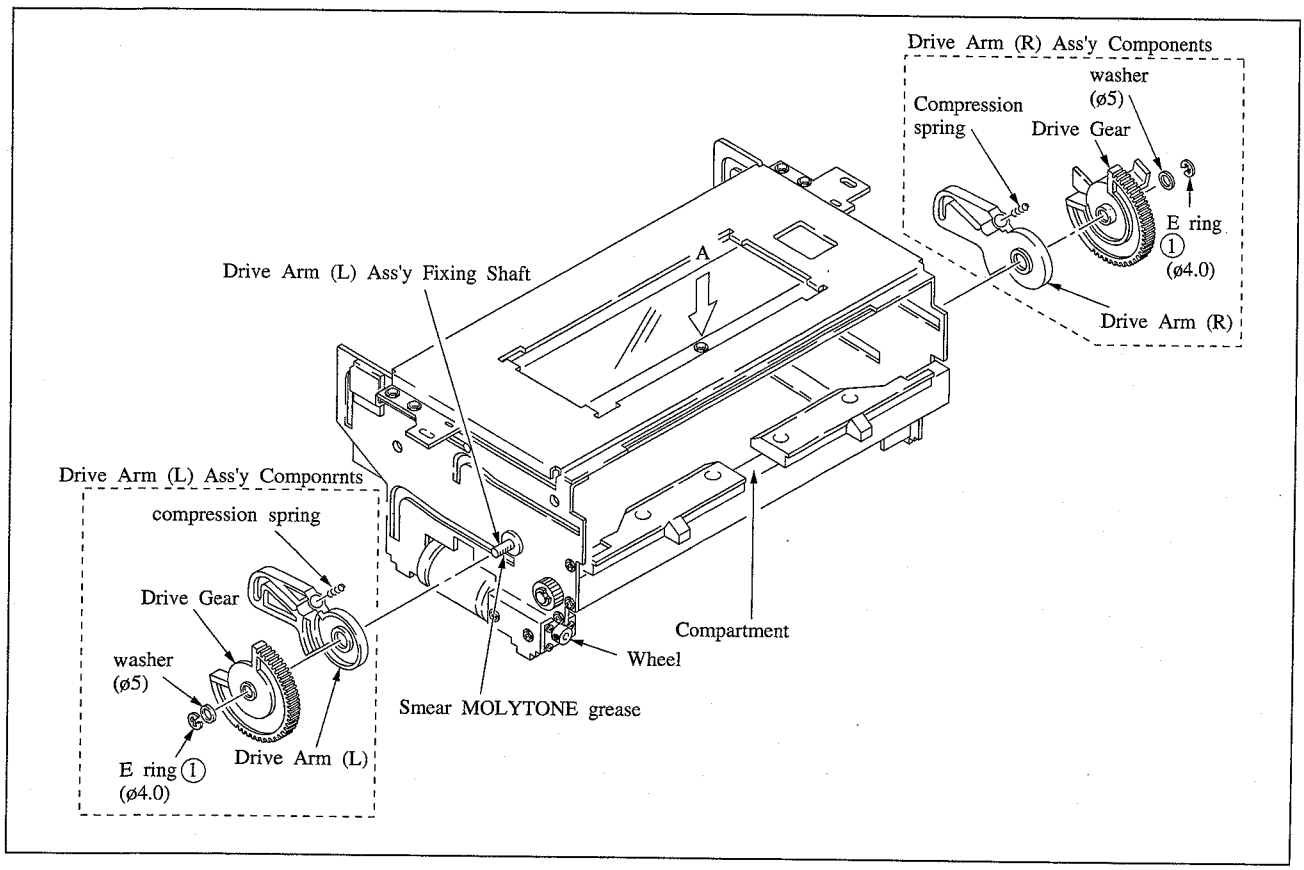


Fig. 6-3-8 Drive Arm L/R Ass'y Components

6. Compartment phase confirmation/adjustment
   (1) Turn the wheel counterclockwise and set the compartment to the cassette-up state.
   (2) Confirm that the position of the compartment for the sun roof of the Cassette Compartment meets the specification.
   Specification: The sun roof must be parallel to the compartment when viewed from just above.If the specification is not met, perform steps (3) and later. If it is met, perform steps (7) and later.
   (3) Turn the wheel again clockwise and move the compartment in the cassette-down direction by 1 to 10 mm.
   (4) Mark the engagement portion of the Drive Arm L Ass'y and gear 3.
   (5) Remove the Drive Arm L Ass'y, shift the engagement of the drive arm's gear and gear 3, then adjust. (Compartment movement per gear thread = Approximately 3 mm)
   (6) Install the Drive Arm L Ass'y using E ring q.
   (7) Turn the wheel counterclockwise and set the compartment to the cassette-up state.

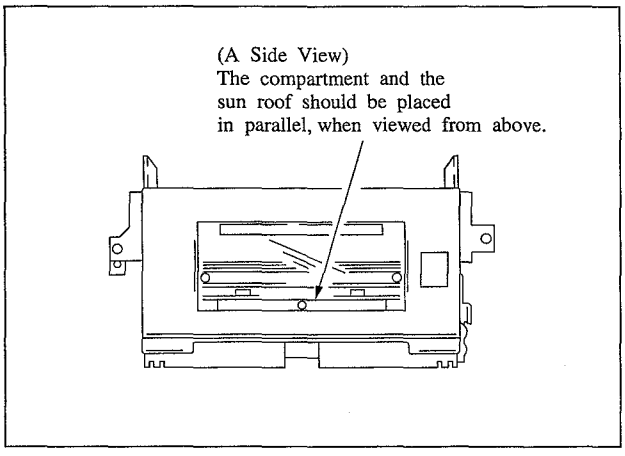


Fig. 6-3-9 Component Phase Adjustment (1)

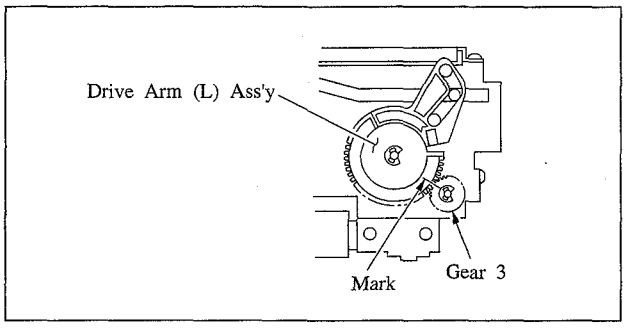


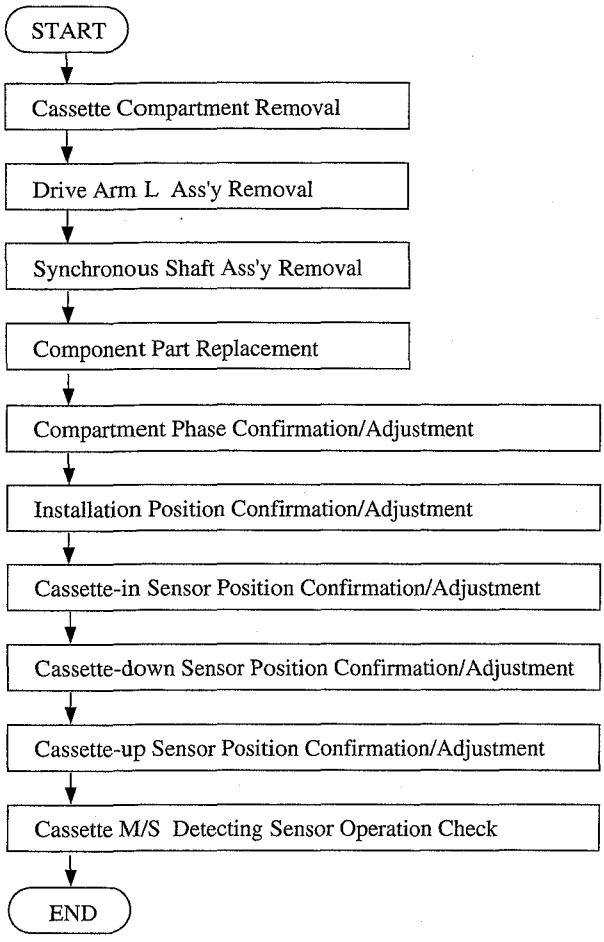
Fig. 6-3-10 Compartment Phase Adjustment (2)

7. Install the Cassette Compartment in the machine.
   (Refer to section 6-2.)
8. Perform the installation position confirmation/adjustment.
   (Refer to section 6-2.)
9. Perform the cassette-in sensor position confirmation/adjustment.
   (Refer to section 6-2.)
10. Perform the cassette-down sensor position confirmation/adjustment.
    (Refer to section 6-2.)
11. Perform the cassette-up sensor position confirmation/adjustment.
    (Refer to section 6-2.)
12. Perform the cassette M/S detecting sensor operation check.
    (Refer to section 6-2.)

6-3-4. Gear 1 Replacement

Basic Knowledge

A. Read the basic knowledge in section 6-3 and prepare the required tool befor replacement.
B. The replacement flowchart is shown below:



Replacement

1. Remove the Cassette Compartment from the machine. (Refer to section 6-2.)
2. Turn the wheel shown in the figure clockwise and set the compartment to the cassette-down state.

   Note: Be careful not to shorten the compression coil spring in a drive arm in this case.

3. Remove E ring ② shown in the figure, then remove the Drive Arm L Ass'y.
4. Remove two of screw ① , then remove the Harness Bracket.
5. Remove E ring ① shown in the figure and pull out the Synchronous Shaft Ass'y from the Cassette Compartment.
6. Remove E ring ③ , then remove gear 1.
7. Clean the Gear 1 Fixing Shaft and smear Molytone grease properly.
8. Install each part in the reverse order of steps 2 through 6.
   - Gear 1
   - Synchronous Shaft Ass'y
   - Harness Bracket
   - Drive Arm L Ass'y

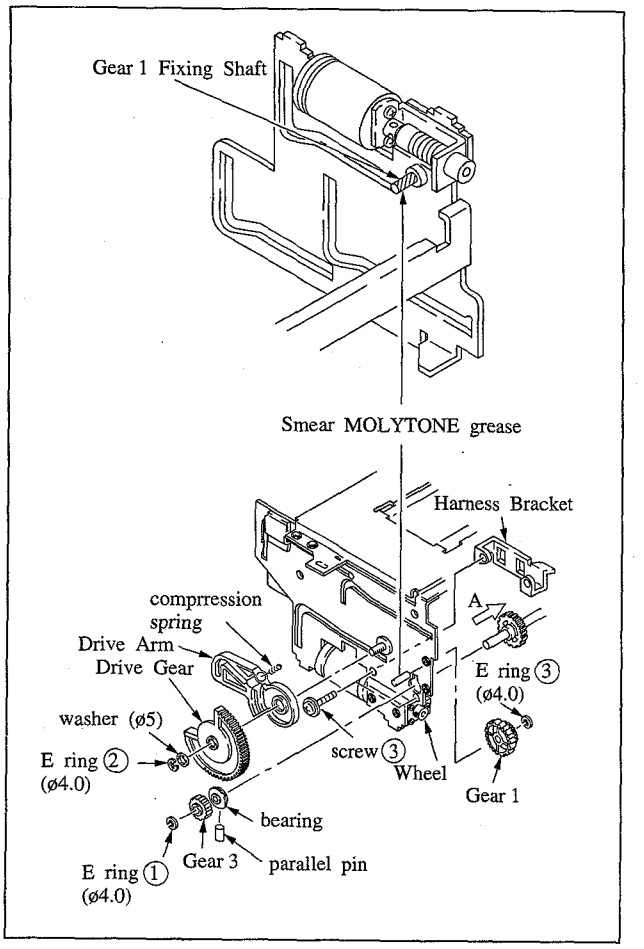


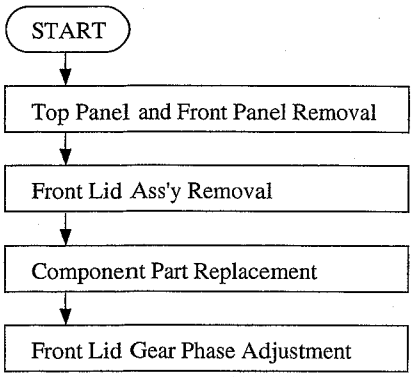
Fig. 6-3-11 Gear1 Removal

9. Perform the component phase confirmation/adjustment. (Refer to section 6.)
10. Turn the wheel counterclockwise and set the compartment to the cassette-up state.
11. Install the Cassette Compartment in the machine. (Refer to section 6-2.)
12. Perform the installation position confirmation/adjustment. (Refer to section 6-2.)
13. Perform the cassette-in sensor position confirmation/ adjustment. (Refer to section 6-2.)
14. Perform the cassette-down sensor position confirmation/ adjustment. (Refer to section 6-2.)
15. Perform the cassette-up sensor position confirmation/ adjustment. (Refer to section 6-2.)
16. Perform the cassette M/S detecting sensor operation check. (Refer to section 6-2.)

6-3-5. Front Lid Ass'y Component Replacement

Basic Knowledge

A. The Front Lid Ass'y is not installed in DVR-C20. This item is thus not required.
B. Read the basic knowledge in section 6-3 and prepare the required tool before replacement.
C. The replacement flowchart is shown below:



Removal

1 Remove two of screw ① , then remove the Front Lid Ass'y from the Cassette Compartment.
2. Remove screw ② and E ring ① as required, then remove the component parts of the Front Lid Ass'y.
3. Replace the required component parts.
   • Smear locking compound properly during installation when four of screw ③ are removed.
   • Smear Molytone grease properly to the fixing shaft of a Lid Opener Arm.

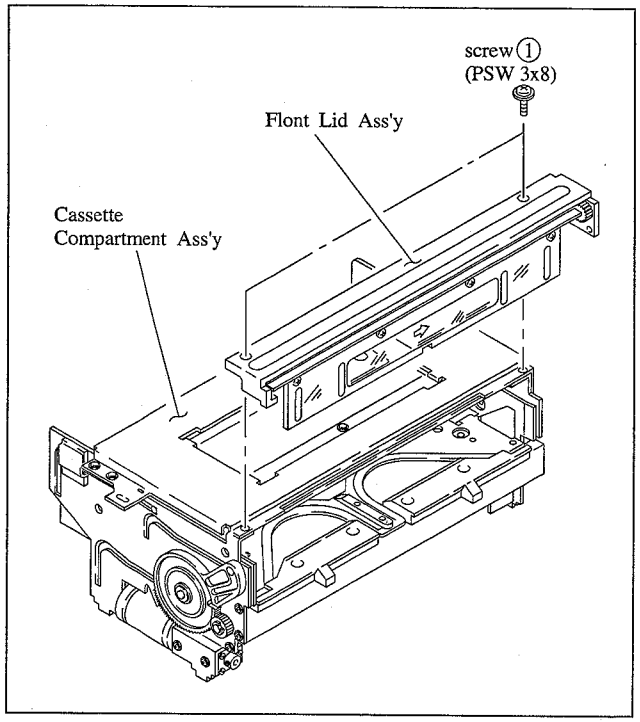


Fig. 6-3-12 Front Lid Ass'y Removal

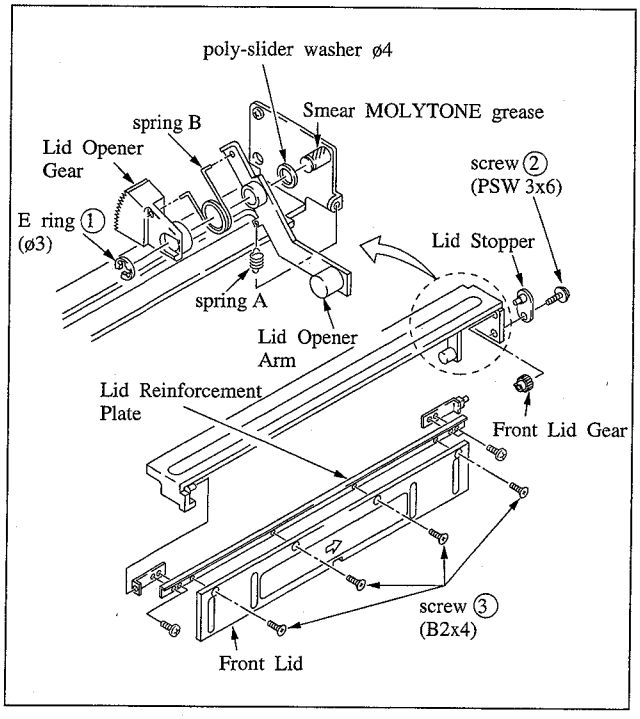


Fig. 6-3-13 Front Lid Ass'y Components

4. Front Lid Gear phase adjustment
   (1) Set the lid perpendicularly to the Lid Support (set the lid to the closed state).
   (2) Engage the teeth perpendicular to the lid of a Front Lid Gear with the first- and second-tooth trough of a Lid Opener Gear
   (3) Install the Lid Stopper with screw ③.
   (4) Confirm steps (1) and (2).
   (5) Confirm that the lid smoothly returns to the direction of arrow E by the spring force when it is pressed with a finger in the direction indicated by arrow D.
5. Install the Front Lid Ass'y in the Cassette Compartment.

Note: Pay attention to the position of the Lid Opener Arm during installation.

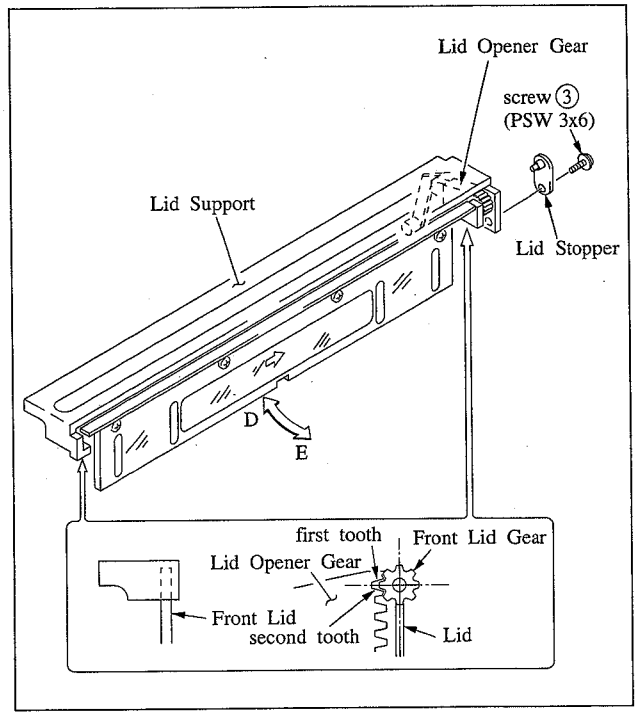


Fig. 6-3-14 Front Lid Gear Phase Adjustment (1)

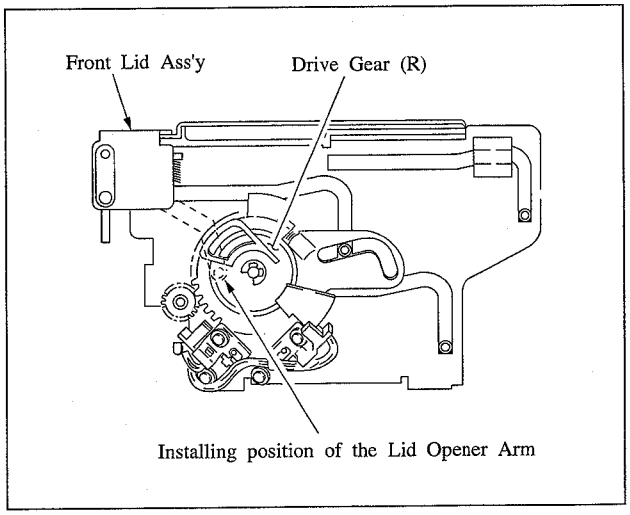


Fig. 6-3-15 Front Lid Gear Phase Adjustment (2)

6-4. INNER DRUM ASS'Y REPLACEMENT

6-4-1. Inner Drum Ass'y Replacement

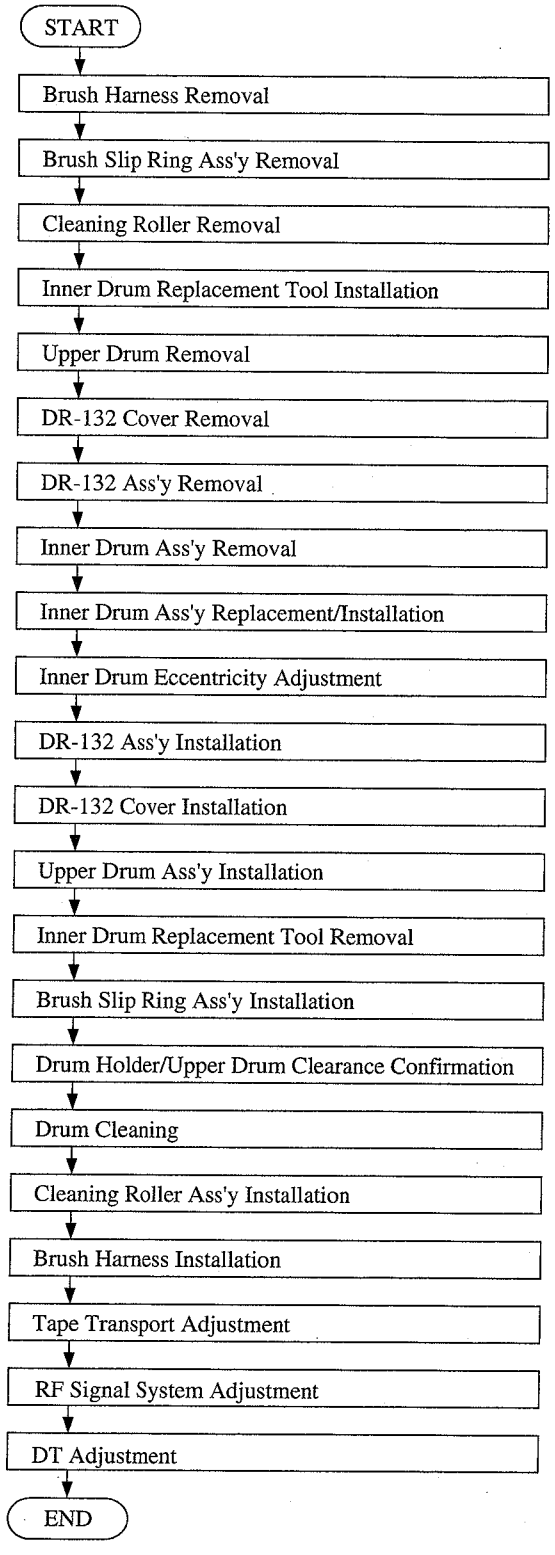
Basic Knowledge

A. It is necessary to perform the Inner Drum Ass'y replacement in case of the following conditions:
   (1) When the head projection of the rotary head reaches the life due to wearing (when the head projection is less than 80 μm in the REC/PB head only).
   (2) When the RF waveform cannot be obtained to the specified waveform even if the tracking adjustment is performed.

B. The following parts are supplied with the Inner Drum Ass'y for repair parts. These parts are used for adjustment after replacement. Be careful not to lose them.

C. Prepare the following tools for replacement and adjustment:
   • Inner Drum Eccentricity Adjustment Tool
     Sony Part No.: J-6253-010-A
   • Inner Drum Replacement Tool
     Sony Part No.: J-6254-130-B
   • Upper Drum Hexagonal Driver (for drum)
     Sony Part No.: J-6254-700-A
   • Cleaning Piece
     Sony Part No.: 2-034-697-00
   • Hexagon Wrench Driver
     Sony Part No.: 7-700-766-02 (Across flat has 1.5 mm)
     7-700-766-03 (Across flat has 2.0 mm)
     7-700-766-04 (Across flat has 2.5 mm)
   • Upper Drum Clearance Confirmation Spacer
     Sony Part No.: J-6254-690-A
   • Ratchet Wrench (Across flat has 3 mm)
     Sony Part No.: J-6254-660-A
   • Cleaning Fluid (or the equivalent)

D. The replacement flowchart is shown below:



Replacement

1. Brush harness removal (Fig. 6-4-1)
   (1) Remove the brush harness from the harness clamper.
   (2) Remove two of screw ① , then remove the board cover. Pull out connector CN333 from the CN-171 board and remove the brush harness.

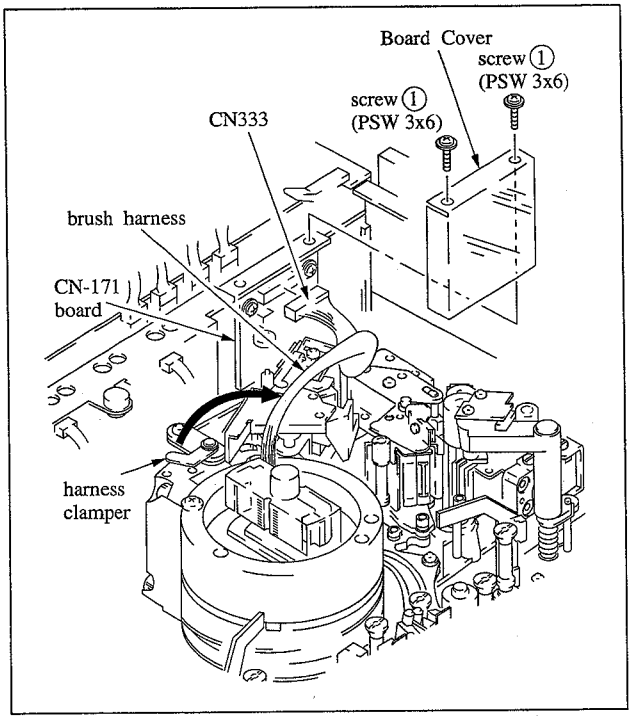


Fig. 6-4-1 Brush Harness Removal

2. Brush Slip Ring Ass'y removal (Fig. 6-4-2)
   Remove two of screw ② , raise the SR stopper by hand, then remove the Bush Slip Ring Ass'y while turning the brush slip ring in the direction indicated by arrow A.

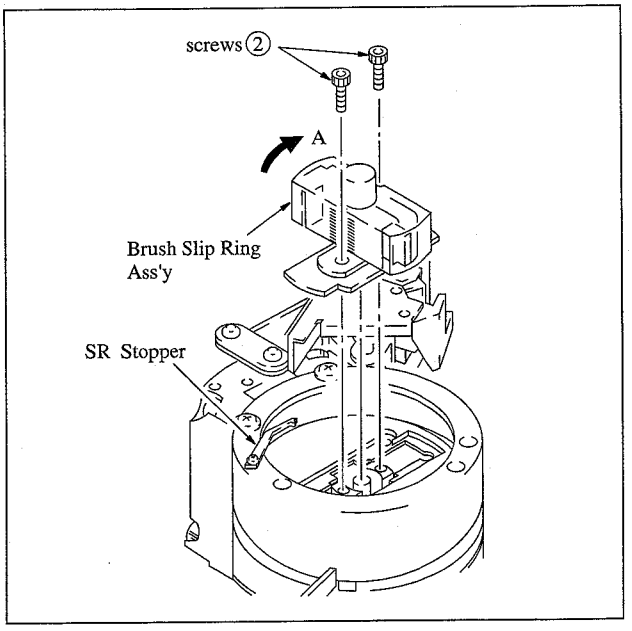


Fig. 6-4-2 Brush Slip Ring Ass'y Removal

3. Cleaning Roller Ass'y removal (Fig. 6-4-3)
   (1) Remove two of screw ③ , then remove the Cleaning Roller Ass'y from the drum holder.
   (2) Remove connector CN802 from the CN-309 board of the Cleaning Roller Ass'y.

   Note: The CN802 harness has a ground pin. Tighten the ground pin together and fix when screw ③ is fixed.

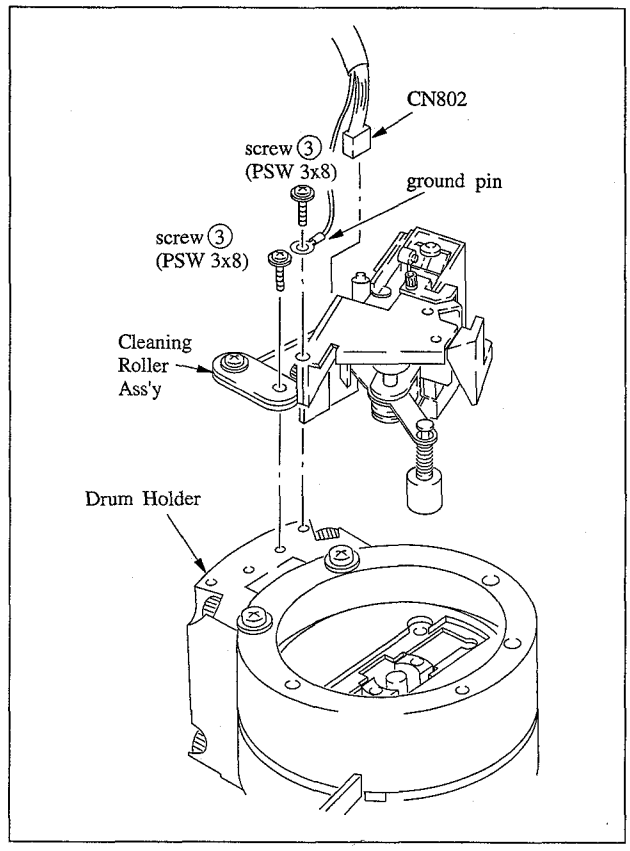


Fig. 6-4-3 Cleaning Roller Ass'y Removal

4. Inner drum replacement tool installation (Fig. 6-4-4)
   This tool is used to prevent the possible damage of a rotary head when the upper drum is installed or removed.
   Use the tool during upper drum installation or removal.
   (1) Turn the Inner Drum Ass'y with a finger and align hole A of the upper drum with hole B of the Inner Drum Ass'y. (Fig. 1)
   (The screw of the lower drum can be seen through hole B when hole A is viewed from just above.)
   (2) Insert the disk stopper pin into hole A until it is inserted into the lower drum mounting screw. (Fig. 1)
   (3) Install the upper drum spacer in the Drum Ass'y. (Fig. 2)
   (4) Install the cap in the disk stopper pin, screw it, and fix the upper drum spacer. (Fig. 3)

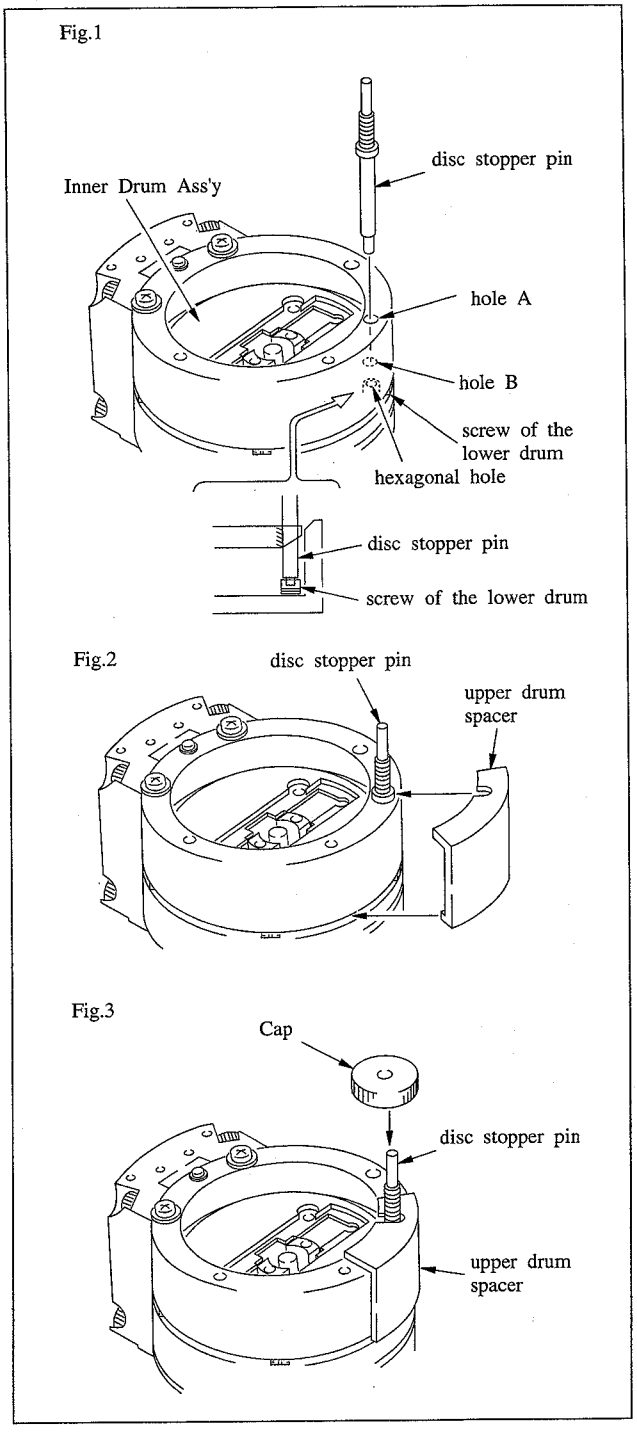


Fig. 6-4-4 Inner Drum Replecement Tool Installation

5. Upper drum Ass'y removal (Fig. 6-4-5)
   Remove two of screw ④ using a ratchet wrench, then remove the upper drum.

   Note: Do not remove the inner drum replacement tool. Use it during installation.

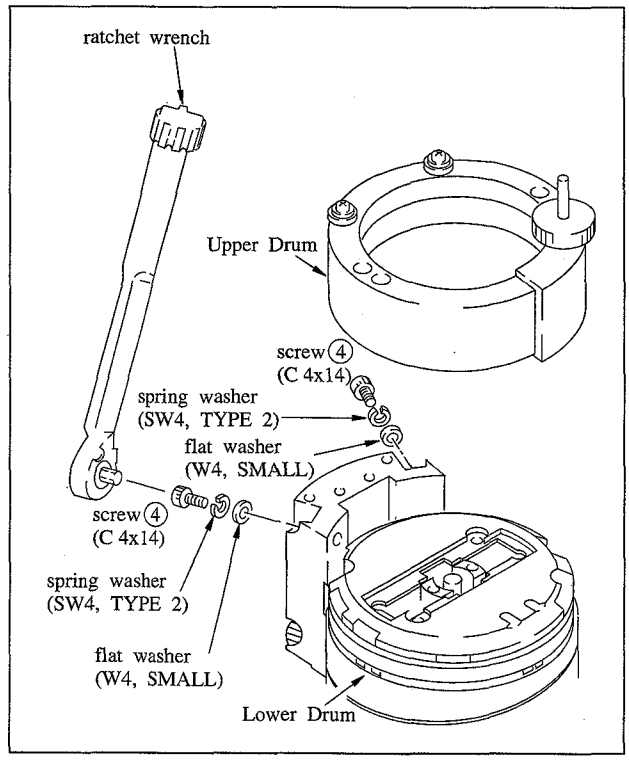


Fig. 6-4-5 Upper Drum Ass'y Removal

6. DR-132 cover removal (Fig. 6-4-6)
   Remove two of screw ⑤ of DR-132 cover displays "5" and "6", then remove the DR-132 cover.

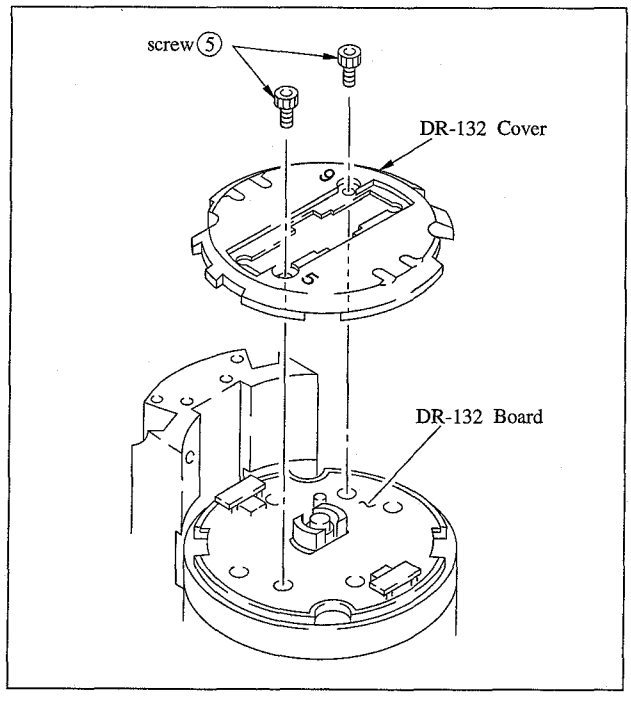


Fig. 6-4-6 DR-132 Cover Removal

7. DR-132 Ass'y removal (Fig. 6-4-7)
   (1) Extract the two DR-175 boards installed in the DR-132 board taking care that no force is applied to the harness.
   (2) Remove four of screw ⑥ , then remove the DR-132 Ass'y from the Inner Drum Ass'y.

   Note: Remove the DR-132 Ass'y taking care not to damage the previously removed DR-175 board.

In this stage, only the component parts of the DR-132 Ass'y can be replaced. Perform steps 11 and later when the DR-132 Ass'y is replaced.

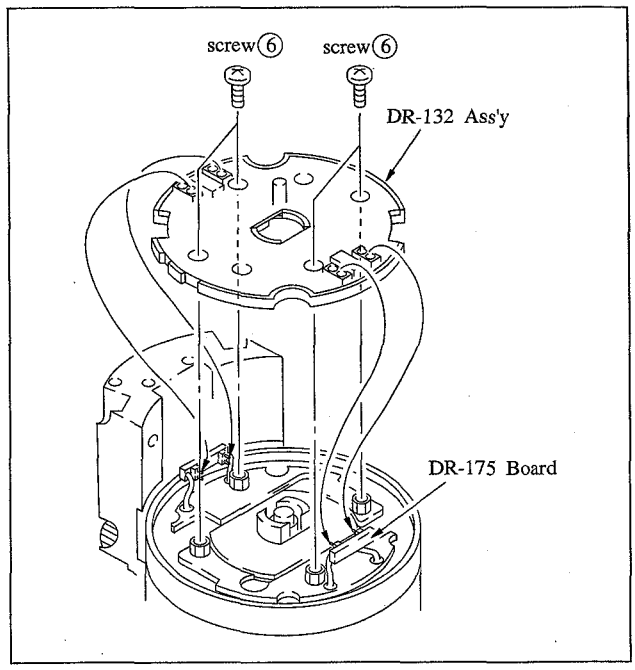


Fig. 6-4-7 DR-132 Ass'y Removal

Head cover installation (Fig. 6-4-8)

The head cover is used to prevent the possible damage of a rotary head when the Inner Drum Ass'y is replaced.

- The head cover is installed in advance in the Inner Drum Ass'y for replacement.
- The installation of the head cover is not required when a disused Inner Drum Ass'y is removed. If you do not wish to damage the rotary head, install the head cover in the Inner Drum Ass'y.

(1) Insert the DR-175 board into the DR-135 board.
(2) Turn the Inner Drum Ass'y with a finger and align the "PLAY A B" indication on the DR-135 board with the position shown in the figure.
(3) Align the head cover with the "PLAY A B" indication on the DR-135 board and install the head cover with four of screw ⑥

8. Inner Drum Ass'y removal
   (1) Turn the Inner Drum Ass'y with a finger and align the "PLAY A B" indication on the DR-135 board with the position shown in the figure.
   (2) Align the "PLAY A B" indication on the DR-135 board with the circumference indication of the head cover and put the head cover on the Inner Drum Ass'y.
   (3) Install the head cover with four screws ⑥ .

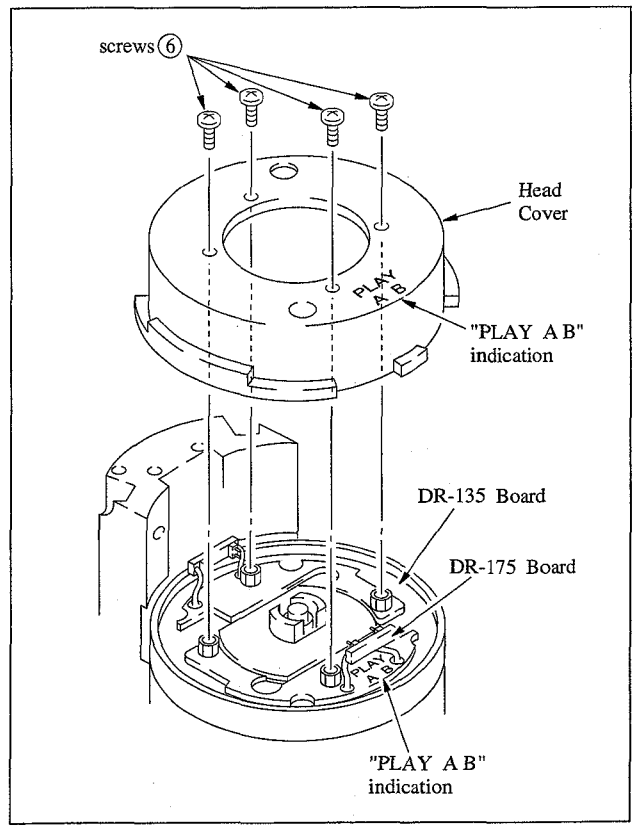


Fig. 6-4-8 Head Cover Installation

(4) Remove two of screw ⑦ from the holes of the head cover shown in the figure.
(5) Raise the Inner Drum Ass'y (with cover) upward, then remove.

9. Inner Drum Ass'y replacement/installation
   (1) The Inner Drum Ass'y for repair parts has a head cover. Adjust the PLAY A B indication position and install the Inner Drum Ass'y in the Lower Drum Ass'y with two of screw ⑦. Remove four of screw ⑥ , then remove the head cover.
   (2) Install the head cover in the Inner Drum Ass'y in which no head cover is installed referring to step 8. Then, install the Lower Drum Ass'y as in step (1).

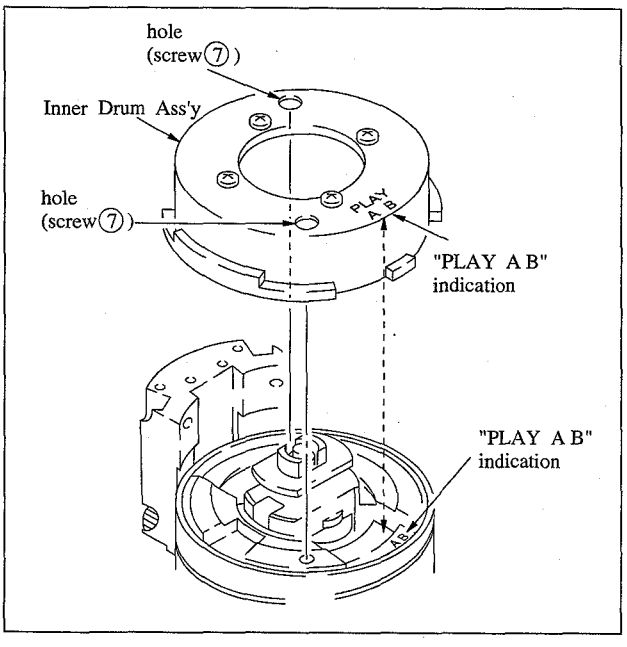


Fig. 6-4-9 Inner Drum Ass'y Replacement

10. Inner drum eccentricity adjustment
    Refer to section 6-4-2.
11. DR-132 Ass'y Installation
    (1) Install the DR-132 Ass'y in the Inner Drum Ass'y with four screws ⑥.
    (2) Insert two DR-175 boards into the DR-132 board. (Refer to Fig. 6-4-8.)
12. DR-132 cover installation
    Install the DR-132 cover in the Inner Drum Ass'y with two screws ⑤.

13. Upper Drum Ass'y Installation (Fig. 6-4-10)
    (1) Clean the drum holder and upper drum's fixing surface with cleaning piece moistened with cleaning fluid. After cleaning, wipe it with dry cloth two or three times.
    (2) Return the Inner Drum Ass'y with a finger and stop it in the position where the screw of the lower drum can be viewed from hole B of the Inner Drum Ass'y.
    (3) Insert the disc stopper pin of the upper drum (in which an inner drum replacement tool is installed) into hole B of the Inner Drum Ass'y from just above and install the Upper Drum Ass'y.
    (4) Install two of screw ④ using an upper drum hexagonal driver.

    Note: Install the upper drum while pressing it so that no clearance occurs between the height determining plate and drum holder.

    (5) Change the upper drum hexagonal driver to the ratchet wrench and tighten screw ④ .
    Tightening torque: 16 kg/cm

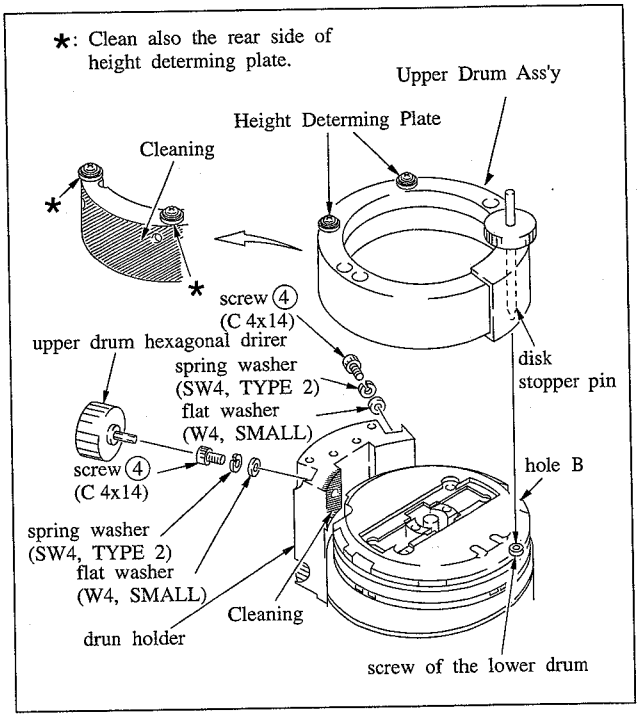


Fig. 6-4-10 Upper Drum Ass'y Installation

14. Inner drum replacement tool removal.
    Remove the tool in the reverse order of step 4.
15. Brush Slip Ring Ass'y installation
    (1) Insert the Brush Slip Ring Ass'y into the drum shaft, raise the SR stopper with a finger, and put the SR stopper in the convex portion of the brush slip ring cover.
    (2) Install the Brush Slip Ring Ass'y in the Inner Drum Ass'y with two of screw ②. At that time, press the DR-133 board and screw after confirming that the Brush Slip Ring Ass'y is firmly fixed on the flange surface.

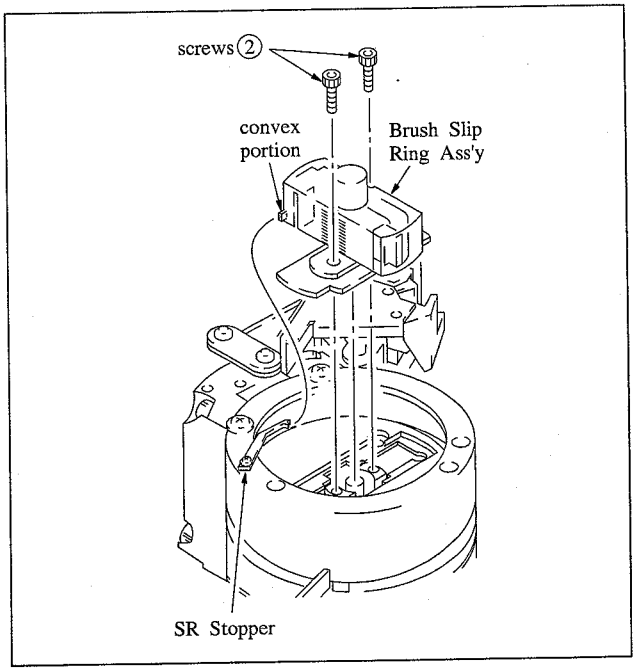


Fig. 6-4-11 Brush Slip Ring Ass'y Installation

16. Confirmation of clearance between drum holder and upper drum (Fig. 6-4-11)
    (1) Using an upper drum position confirm spacer, confirm that no clearance exists between the height determining plate and drum holder shown in the figure.
    If the clearance exists, repeat steps 13 and later.

17. Clean the drum's tape transport path.
    Refer to section 5-2, "Cleaning".
18. Cleaning Roller Ass'y installation.
    Install the Cleaning Roller Ass'y in the reverse order of step 3.
    Tighten a ground pin together with the Cleaning Roller Ass'y.
19. Brush harness installation.
    Install the brush harness in the reverse order of step 1.
20. Perform the tape transport adjustment.
    Refer to section 9.
21. Perform the RF signal system adjustment.
    Refer to section 13.
22. Perform the DT adjustment.
    Refer to section 12.

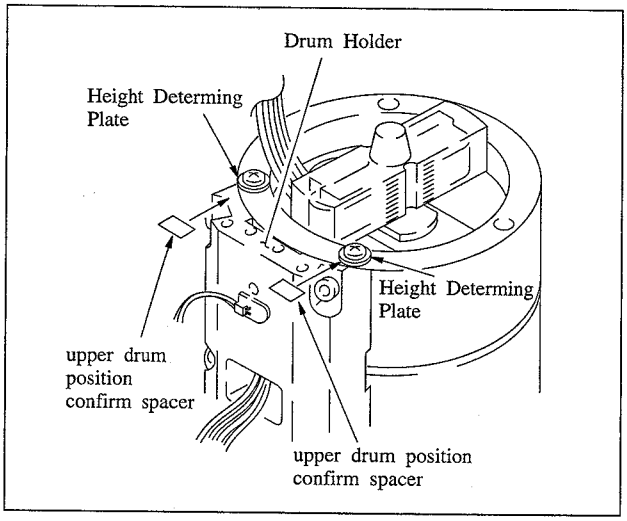


Fig. 6-4-12 Confirmation of Clearance between Drum Holder and Upper Drum

6-4-2. Inner Drum Eccentricity Adjustment

Basic Knowledge

A. Perform the inner drum eccentricity adjustment when the Inner Drum Ass'y is replaced or removed and when the screw ① fixing the Inner Drum Ass'y is loosened.

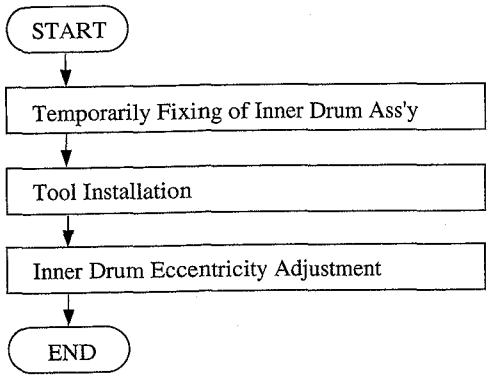
B. Prepare the following tool for eccentricity adjustment:
Inner Drum Eccentricity Adjustment Tool JB-5401
Sony Part No.: J-6254-010-A

C. Remove the parts below that are installed in the Drum Ass'y when performing the adjustment.
- Cleaning Roller Ass'y
- Upper Drum
- Brush Sling Ring Ass'y
- DR-132 Cover
- DR-132 Ass'y

Refer to section 6-3-1 when removing the above parts. Be careful not to damage the rotary head or the side surface of the drum.

D. Perform the tool operation check referring to section 5-4-1 before adjustment.

E. The adjustment flowchart is shown below:



Adjustment Procedure

1. Temporarily fixing of Inner Drum Ass'y (Fig. 6-4-13)
Loosen two of screw ① shown in the figure by 1/2 turn and set the Inner Drum Ass'y to the temporarily fixing state.

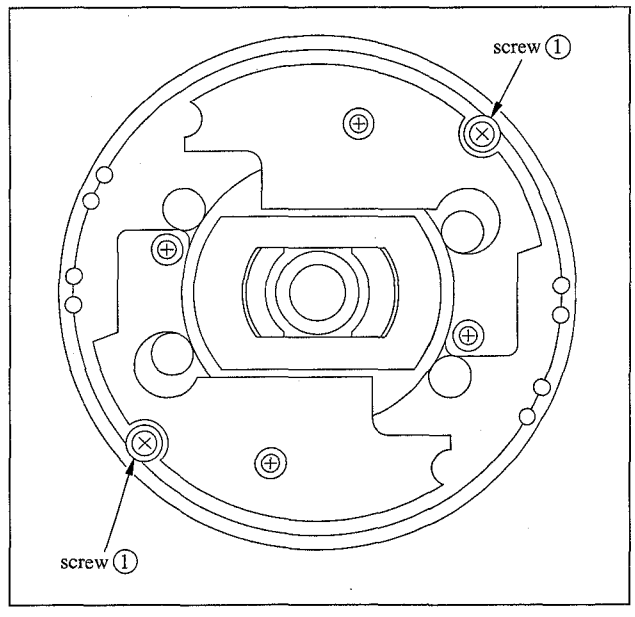


Fig. 6-4-13 Temporary Fixing of Inner Drum Ass'y

2. Tool installation (Fig. 6-4-14)
   (1) Turn knob ① of the tool counterclockwise.
   (2) Move the dial gauge block of the tool in the direction indicated by arrow A and confirm that no clearance exists in the place shown in Fig-1.
   (3) Move the dial gauge block in the direction indicated by arrow C while pulling knob ② in the direction of arrow B, then lock the block.
   (4) Install the tool in the drum holder and tighten it with knob ③.

   Note 1: Do not touch the rotary head during tool installation. Be careful not to damage the side surface of the drum.
   Note 2: Install the tool firmly so that no clearance exists between the tool and drum holder.

   (5) Turn the inner drum with a finger so that the probe of the tool does not strike against the rotary head, then set the rotary head free.
   (6) Rotate the zero-point adjustment knob of the tool clockwise by one to two turns.
   (7) Hold the dial gauge block by hand and pull knob ② in the direction indicated by arrow B.
   (8) Move the dial gauge block gently in the direction indicated by arrow E so that it strikes against the side surface of the drum.

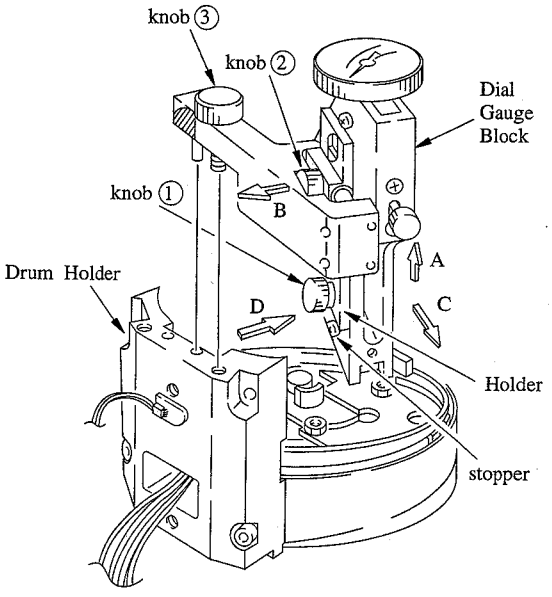
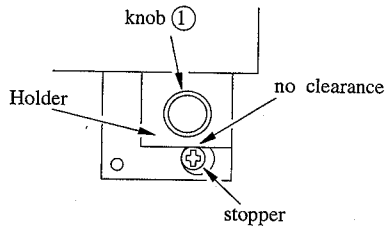


Fig.1
(viewing from D)



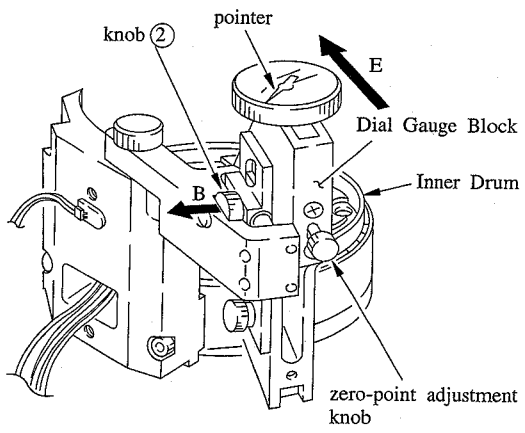


Fig. 6-4-14 Tool Installation

3. Confirmation of tool and head contact surface (Fig. 6-4-3)
   (1) Confirm that two ribs touch the side surface of the lower drum as shown in the figure.
   (2) Confirm that the measurement pin strikes against the side surface of the inner drum (the pin does not strike against it yet). Confirm that the measurement pin does not touch the rotary head. If it touches, repeat steps 1 and later.

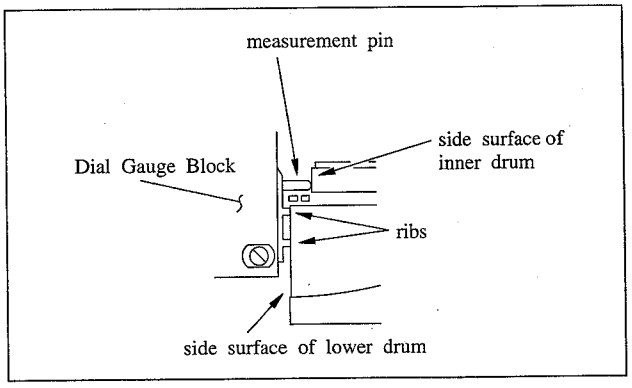


Fig. 6-4-15 Confirmation of Tool and Head Contact Surface

4. Inner drum eccentricity adjustment
   (1) Turn the zero-point adjustment knob of the tool slowly counterclockwise so that it touches the side surface of the inner drum.
   (2) Adjust the pointer of the dial gauge to zero.
   (3) Turn the inner drum slowly clockwise.
   Confirm that the pointer deflection of the dial gauge obtained when the inner drum is rotated by one turn meets the specification.

   Specification: With 2 μm

   If the specification is met, perform steps (6) and later. If it is not, perform steps (4) and later.
   (4) Turn the inner drum slowly clockwise with a finger and stop it in the position where the pointer deflection of the dial gauge is minimum.
   (5) With a finger, press the upper edge of the inner drum on the opposite side of the tool's measurement pin by 180 degrees and adjust so that the pointer deflection of the dial gauge is a half of the maximum value.
   (6) Tighten two screws ① alternately.
   Tightening torque: 12 kg/cm.
   Perform step (3) again after the screws are tightened and confirm that the specification is met.
5. Remove the tool in the reverse order of step 2.

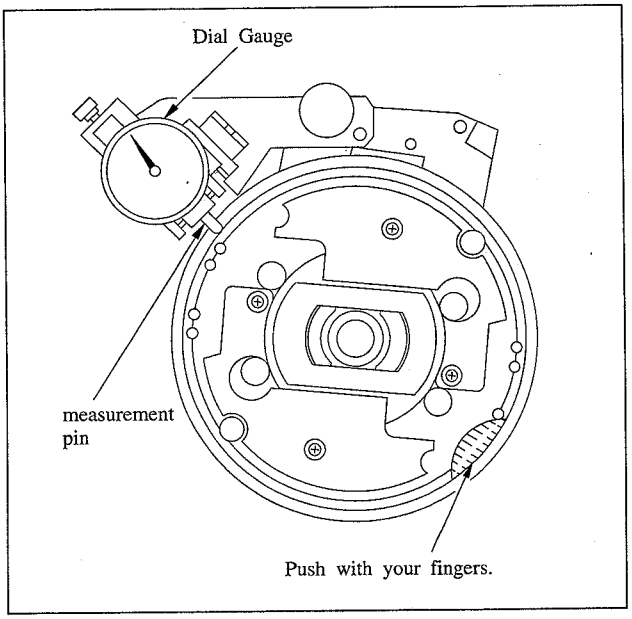


Fig. 6-4-16 Inner Drum Eccentricity Adjustment

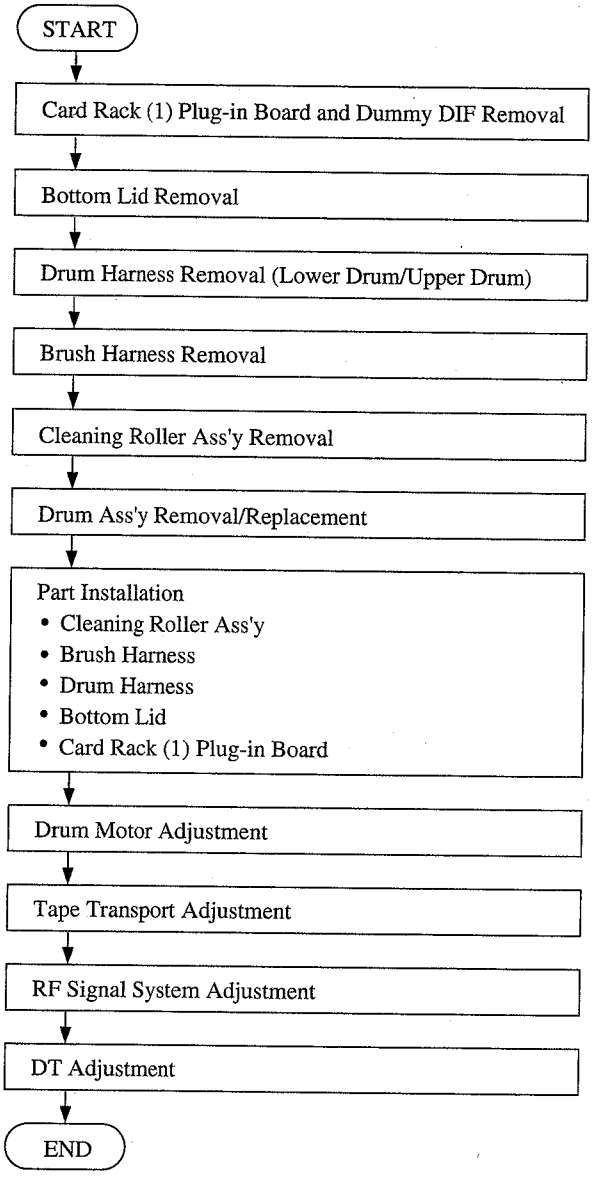
6-5. DRUM ASS'Y REPLACEMENT

Basic Knowledge

A. It is necessary to perform the Drum Ass'y replacement in case of the following conditions:
   (1) When the RF waveform cannot be obtained to the specified waveform even if the tracking adjustment is performed because the lead surface of a lower drum or the tape transport surface of an upper drum is worn.
   (2) When the lead surface of a lower drum and the tape transport surface of upper and lower drums are damaged and cannot be corrected.
   (3) When the specifications of the VTR cannot be maintained due to the bearing life of a drum rotor block.

B. Prepare the following tools:
   - Hexagon Wrench Driver (Across flat has 2.5 mm)
     Sony Part No.: 7-700-766-04
   - Torque Screwdriver (12 kg.cm)
     Sony Part No.: J-6252-520-A
   - Torque Screwdriver Bit Set
     Sony Part No.: J-6252-540-A
   - Thickness Gauge
     Sony Part No.: J-6041-670-A
   - Cleaning Fluid (or the equivalent)
   - Cleaning Piece
     Sony Part No.: 2-034-697-00

C. The replacement flowchart is shown below:



Replacement

1. Card rack (1) plug-in board and dummy DIF removal
   (1) Remove the Card rack (1) Plug-in board (PR-157 board, DE-37 board, EN-99 board and AD-73 board). (DVR-C20/C20P does not have AD-73 board.)
   (2) Remove two fixing screws of dummy DIF as shown in the figure, and remove the dummy DIF.

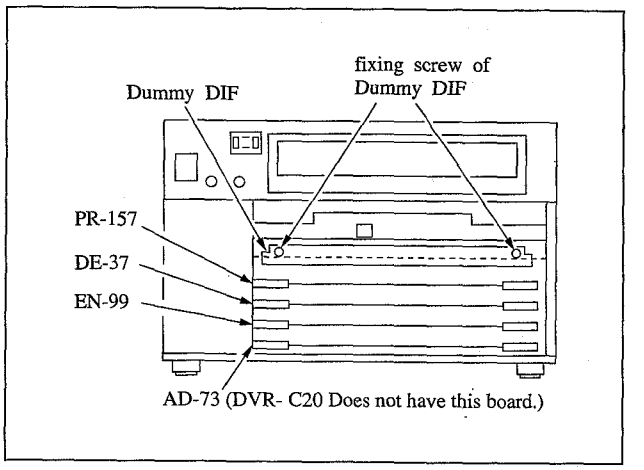


Fig.6-5-1 Card Rack (1) Plug-in Board and Dummy DIF

2. Drum harness removal (Lower side of drum)
   (1) Turn the power block upside down and lay the machine on its side.

   Note: Be careful not to shock the machine.

   (2) Remove four of screw ①, then remove the bottom lid.

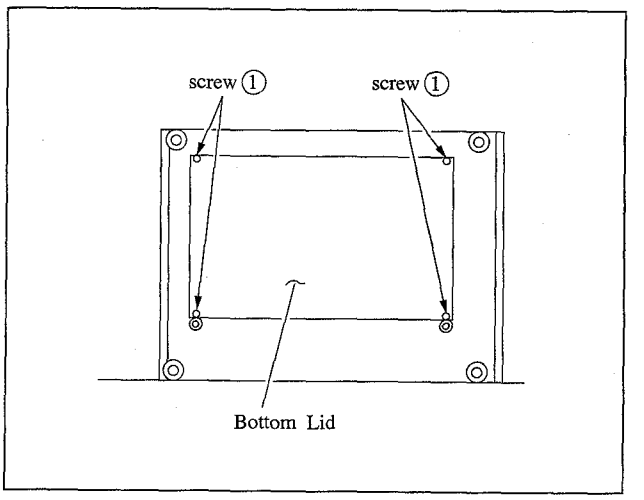


Fig.6-5-2 Bottom Lid Removal

   (3) Remove connectors CN321, CN322, and CN323 that are connected to the drum.
   (4) Return the machine to the horizontal position.

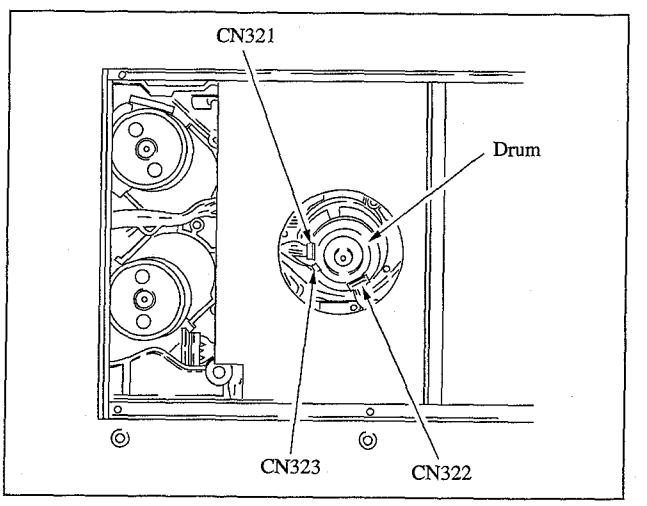


Fig.6-5-3 Drum Harness Removal (Lower Side of Drum)

3. Drum harness removal (on TTP side)
   (1) Remove the connectors of the drum harnesses from each board.
   (2) Remove the drum harnesses from the harness clampers.
4. Brush harness removal
   (1) Remove two of screw ②, then remove the board cover.
   (2) Remove the brush harness connector from the CN-171 board.

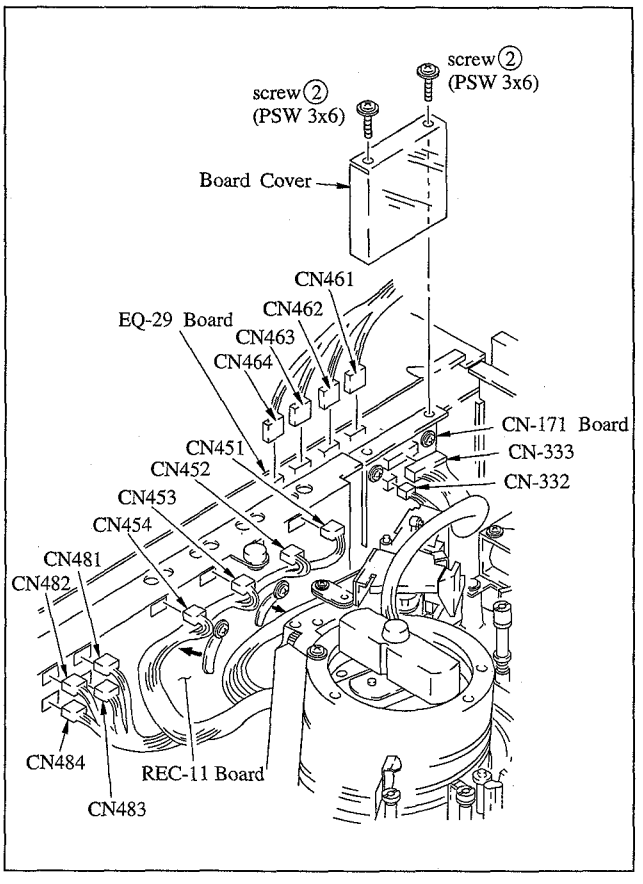


Fig.6-5-4 Drum Harness (on TTP side)/ Brush Harness Removal

5. Cleaning Roller Ass'y removal (Fig. 6-5-5)
   (1) Remove two of screw ③ , then remove the Cleaning Roller Ass'y from the drum holder.
   (2) Remove connector CN802 from the CN-309 board of the Cleaning Roller Ass'y.

   Note: A ground pin is installed in the CN802 harness. Tighten the ground pin together for installation when screws ③ are fixed.

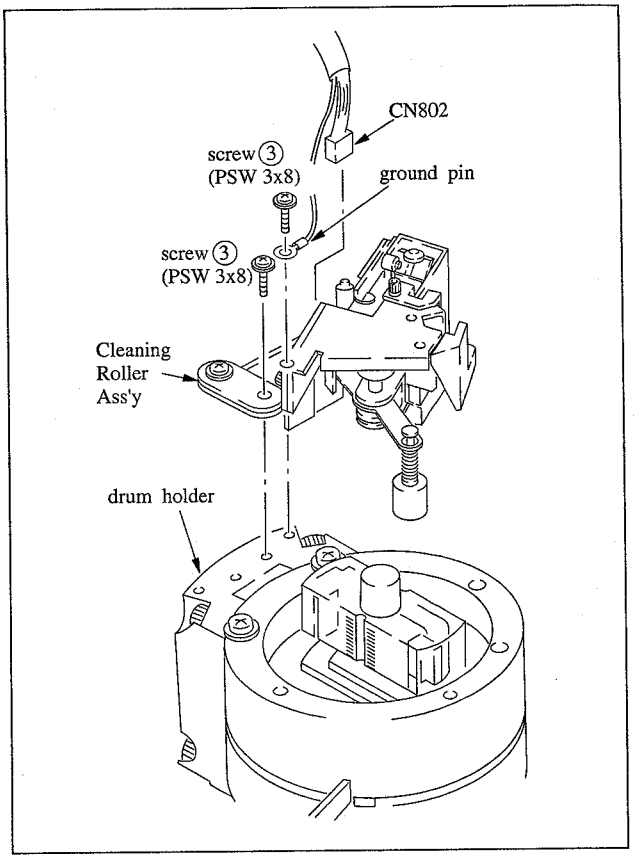


Fig.6-5-5 Cleaning Roller Ass'y Removal

6. Drum Ass'y removal (Fig. 6-5-6)
   • The Drum Ass'y is installed in the machine with three of screw ④ beneath holes A, B, and C shown in the figure. The Drum Ass'y can be removed by removing screws ④ .
   (1) View hole A shown in the figure from the above and seek for screw ④ while turning the Inner Drum Ass'y clockwise with a finger.
   Align the mark in the inner drum shown in the figure with hole A. Screw ④ can then be confirmed.
   (2) Loosen screws ④ completely using a hexagon wrench driver.
   (3) Perform the operation for holes B and C in the same manner as in the procedure of steps (1) and (2). Loosen two of screw ④ completely.

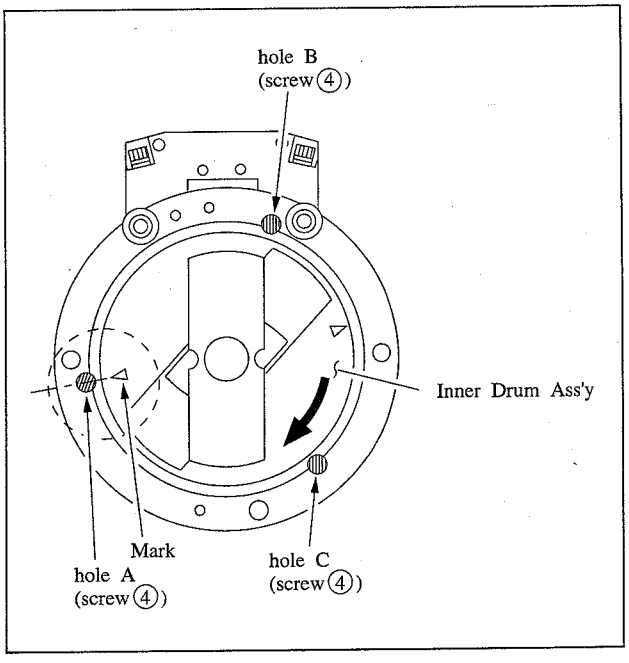


Fig.6-5-6 Drum Ass'y Removal

(4) Remove the Drum Ass'y from the drum base.

7. Drum Ass'y installation (Fig. 6-5-7)
   (1) Clean the contact surface of the Drum Ass'y and drum base with cleaning piece moistened with cleaning fluid. After cleaning, wipe it with dry cloth two or three times.
   (2) Align the two positioning holes of the Drum Ass'y with the two positioning pins of the drum base, then install the Drum Ass'y in the base.

   Note: Confirm that no play exists with the Drum Ass'y installed in the base.

   (3) Tighten three of screw ④ in the procedure of step 6, (1) through (3).

   Tightening torque: 12 kg/cm

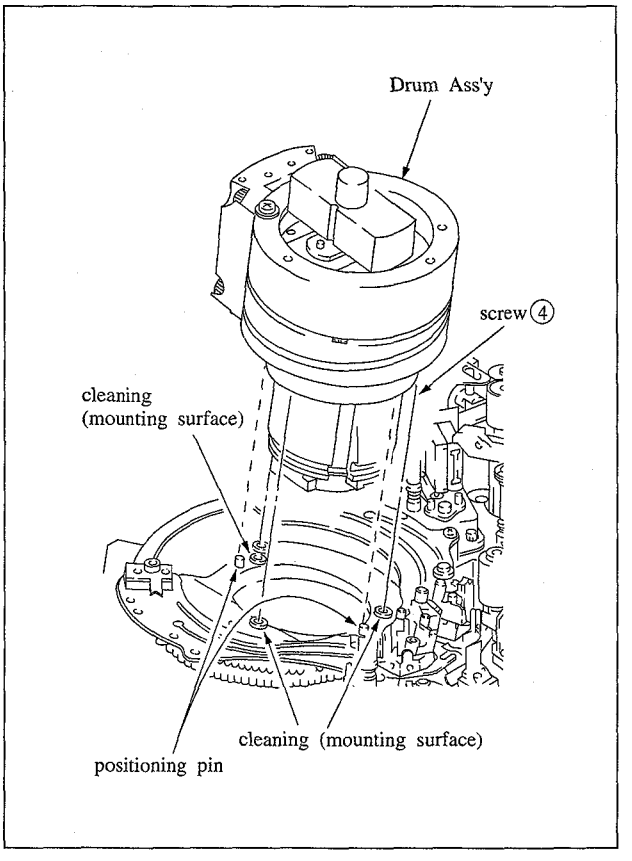


Fig.6-5-7 Drum Ass'y Replacement

8. Part installation
   - Cleaning Roller Ass'y
   - Brush Harness
   - Drum Harness
   - Card Rack (1) Plug-in Board

   (1) Install the parts above in the reverse order of steps 1 through 5.
   (2) Clean the drum tape transport surface and tape lead surface in accordance with the section 5-2 cleaning after each part is installed.
9. Perform the drum motor adjustment.
   Refer to section 10.
10. Perform the tape transport adjustment.
    Refer to section 9.
11. Perform the RF signal system adjustment.
    Refer to section 13.
12. Perform the DT adjustment.
    Refer to section 12.

6-6. BRUSH SLIP RING ASS'Y REPLACEMENT

Basic Knowledge

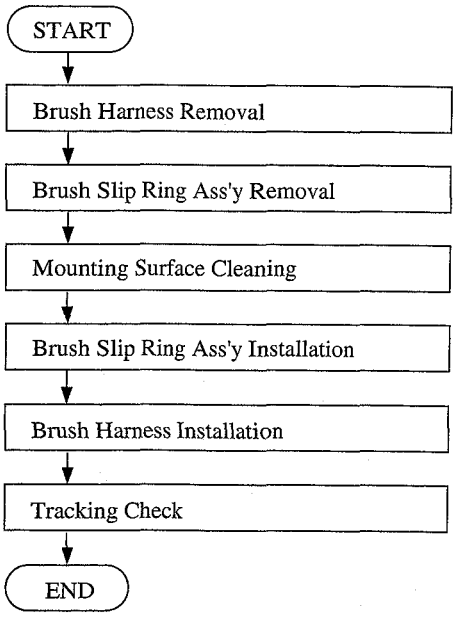
A. Replace the whole assembly when replacing the Brush Slip Ring Ass'y. The component part of this assembly cannot be replaced as the service part.

B. Never apply conductive grease on the contacting point of the brush slip ring. The performance cannot be guaranteed.

C. It is not necessary to perform the adjustment after replacement. Confirm that the brushes are placed in the groove of the slip ring after replacement.

D. Prepare the following tools:
- Cleaning Piece
  Sony Part No.: 2-034-697-00
- Cleaning Fluid (or the equivalent)
  Sony Part No.: 9-919-573-00

E. The replacement flowchart is shown below:



Replacement

1. Brush harness removal
   (1) Remove the brush harness from the harness clamper.
   (2) Remove two of screw ①, then remove the board cover. Extract connector CN333 from the CN-171 board and remove the brush harness.

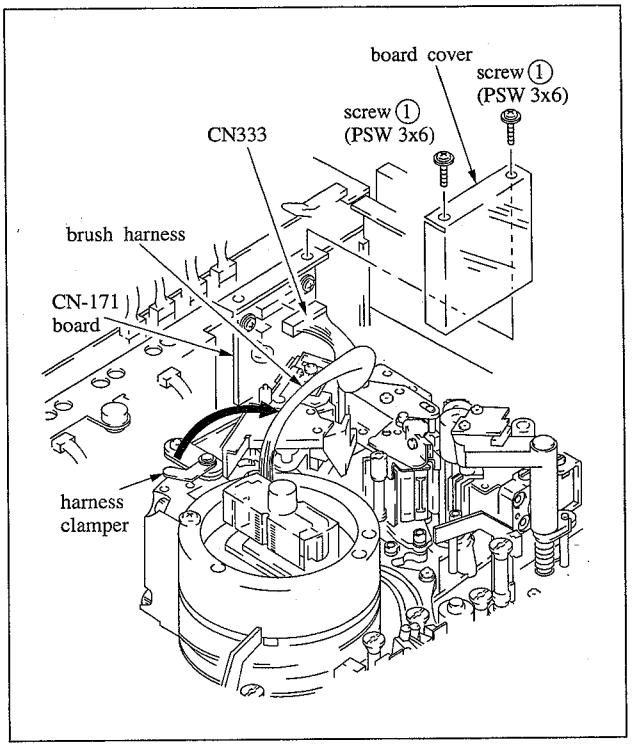


Fig.6-6-1 Brush Harness Removal

2. Brush Slip Ring Ass'y removal (Fig. 6-6-2)
   Remove two of screw ② and raise the SR stopper by hand. Remove the Brush Slip Ring Ass'y while turning it in the direction indicated by arrow A.
3. Mounting surface cleaning
   Clean the new Brush Slip Ring Ass'y to be replaced and the mounting surface of the drum with cleaning piece moistened with cleaning fluid. After cleaning, wipe them with dry cleaning piece two or three times.
4. Brush Slip Ring Ass'y installation
   Refer to step 15 of section 6-4-1.
5. Brush harness installation
   Install the brush harness in the reverse order of step 1.
6. Tracking check
   Refer to section 5-3.

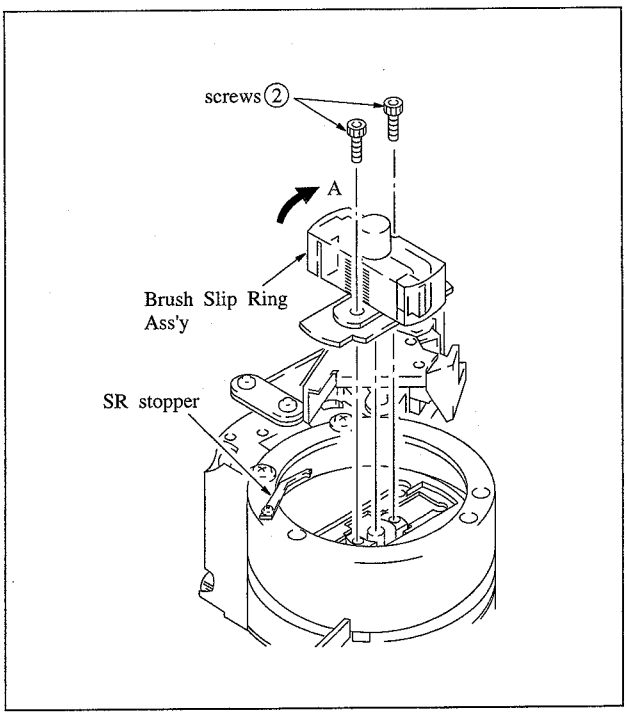


Fig.6-6-2 Brush Slip Ring Ass'y Removal

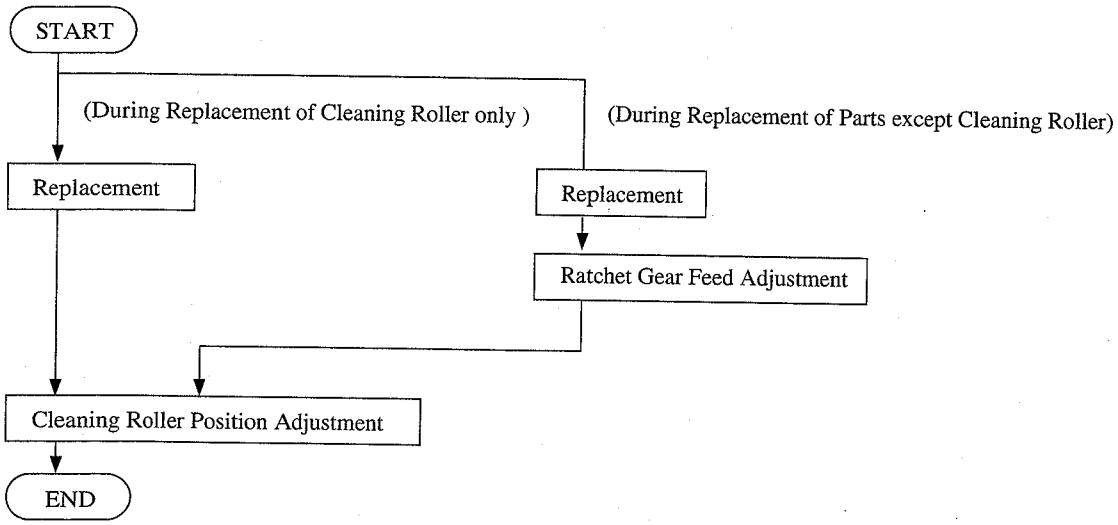
6-7. CLEANING ROLLER ASS'Y REPLACEMENT

Basic Knowledge

A. The Cleaning Roller that is a component part of the Cleaning Roller Ass'y is replaced periodically. Replace this part during periodical replacement.

B. Prepare the following tool for replacement:
- Thickness Gauge
  Sony Part No.: J-6041-670-A

C. The replacement flowchart is shown below:



Replacement

1. Cleaning Roller Ass'y removal (Fig. 6-7-1)
   (1) Remove two of screw ①, then remove the Cleaning Roller Ass'y from the drum holder.
   (2) Remove connector CN802 from the CN-309 board of the Cleaning Roller Ass'y.

   Note: A ground pin is installed in the CN802 harness. Tighten the ground pin together for installation when screws ① are fixed.

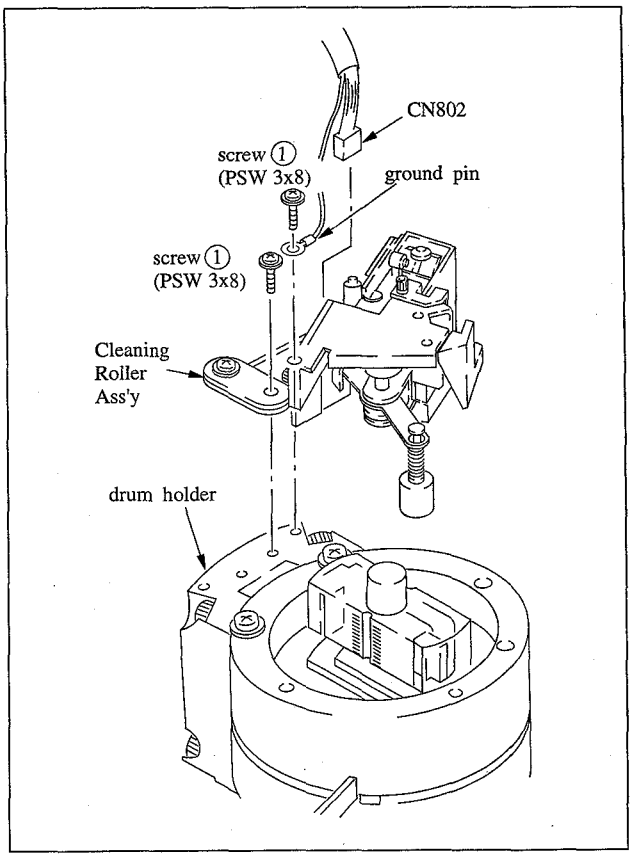


Fig. 6-7-1 Cleaning Roller Ass'y Removal

2. Cleaning Roller replacement/installation
   • To replace only the Cleaning Roller in the component part of the Cleaning Roller Ass'y, perform this step, then step 5.
   (1) Remove the shaft cap shown in the figure, then remove the Cleaning Roller.
   (2) Install the Cleaning Roller while paying attention to the direction of a step spacer. In this case, install the Cleaning roller with the spacer block upward.
   (3) Install the Cleaning Roller Ass'y in the reverse order of step (1).

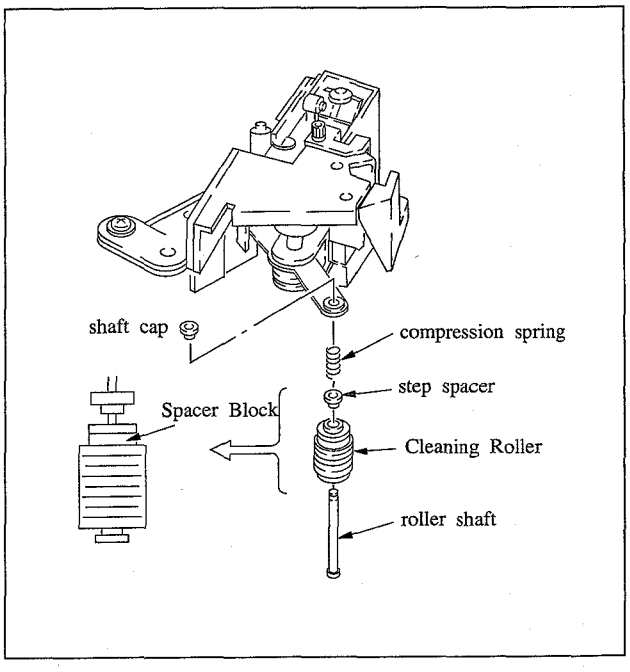


Fig. 6-7-2 Cleaning Roller Replacement

3. Component part replacement (Component parts except Cleaning Roller)
   (1) Replace the component parts of the Cleaning Roller Ass'y in accordance with the procedure shown in the figure.
   • Unhook the C Press Arm Ass'y and Ratchet Drive Plate Ass'y shown in the figure when tension springs ① and ② are removed.

   Note: Never loosen screws ② and ③ shown in the figure.

   (2) Install the Cleaning Roller Ass'y in the machine in the reverse order of step (1) after replacement.

Assemble the parts in the reverse order.

Fig.1 Removal of plunger unit

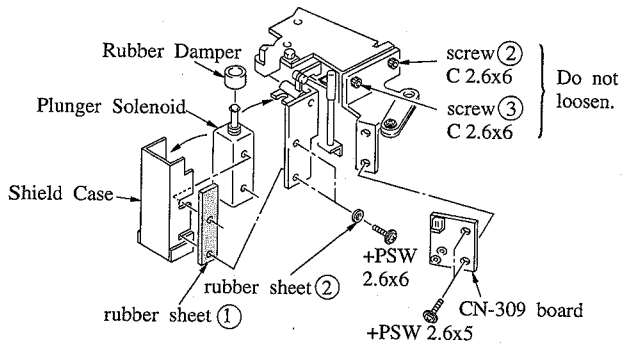


Fig.2 Removal of cam unit

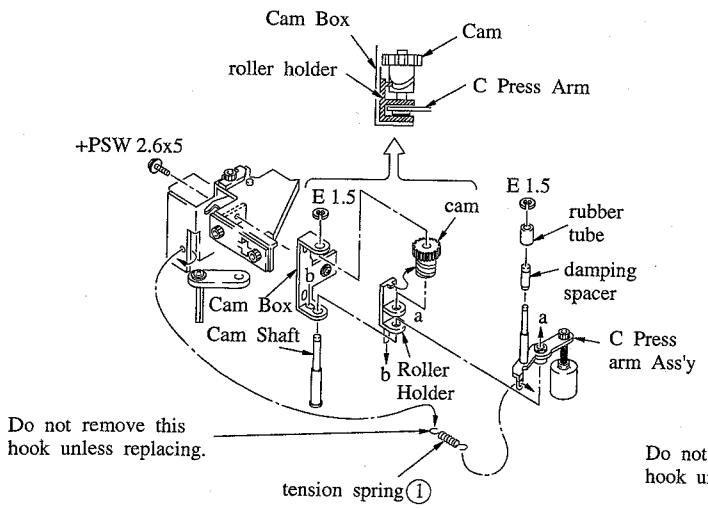


Fig.3 Removal of drive arm unit

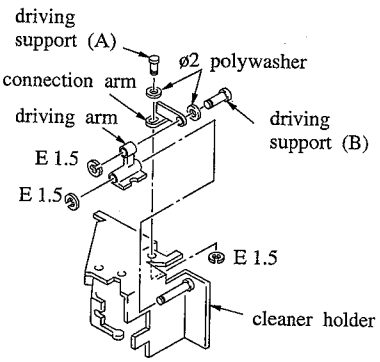


Fig.4 Removal of ratchet gear unit

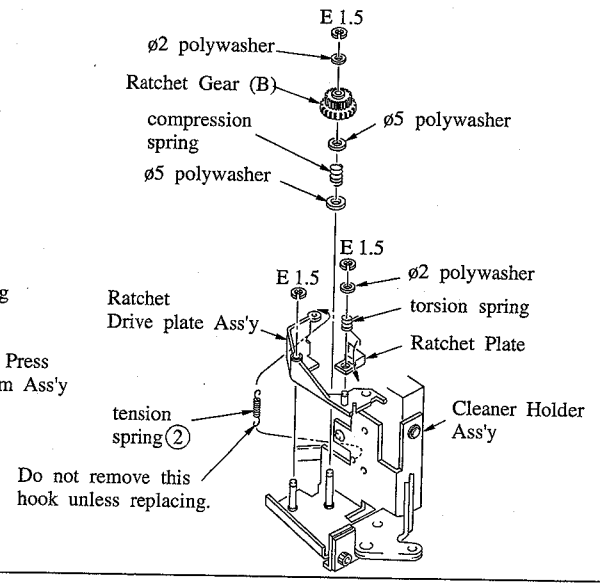


Fig. 6-7-3 Cleaning Roller Ass'y Component Parts

4. Ratchet Gear feed adjustment (Fig. 6-7-4)
(Control panel: BKDV-101)
(1) Turn the machine power on.
(2) Mark the portion of the Racket Gear shown in the figure.
(3) Press the keys on the control panel in the order below:

[TEST], [F6] (CHECKER), [F1] (CONTINUE),
[F3] (C), [4], [SET], [F6] (F), [3], [SET]
The test mode of the Cleaning Roller is then entered.

(4) Press the [<] key on the control panel to turn the Ratchet Gear clockwise. Align the marked portion of the Ratchet Gear with line A shown in the figure.
(5) Press the [<] key on the control panel 30 times and confirm that the specification below is met.
Specification: The Ratchet Gear rotates 360 degrees and the marked portion of the Ratchet Gear exists between lines A and B.If the specification is met, perform steps 6 and later. If it is not, perform steps (6) and later.
(6) Perform the adjustment below to meet the specification in step (5).
• When the marked portion is placed in the counterclockwise direction against line A (the Racket Gear does not rotate 360 degrees)
Loosen screw ① by 1/4 turn and move the stopper plate in the direction indicated by arrow C.
After adjustment, tighten screw ①.
• When the marked portion is placed in the clockwise direction against line B
Loosen screw ① by 1/4 turn and move the stopper plate in the direction indicated by arrow D.
After adjustment, tighten screw ①.
(7) Reconfirm that the specification in step (5) is met.
(8) Press the keys on the control panel in the order below:

[F8] (=), [0], [SET]
The home menu is returned from the test mode.
(9) Turn the machine power off.

5. Cleaning Roller position adjustment
(1) Confirm that clearance A between the drum's side surface and Cleaning Roller meets the specification.
Specification: 0.25 mm ≦ A ≦ 2.5 mm
If the specification is not met, perform steps (2) and late.
(2) Loosen screws ④, ⑤, and ⑥ by 1/4 turn.
(3) Move the Cleaning Roller Ass'y in the direction indicated by arrow B and adjust so that the specification is met.
(4) Tighten screws ④, ⑤, and ⑥.
(5) Reconfirm that the specification is met.

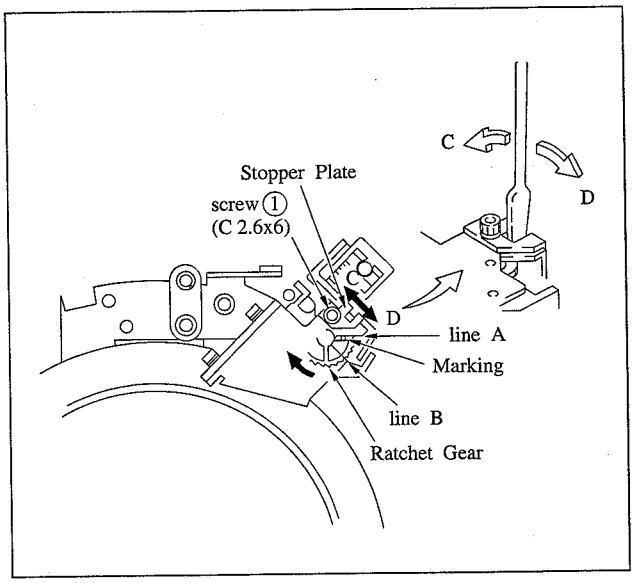


Fig. 6-7-4 Ratchet Gear Feed Adjustment

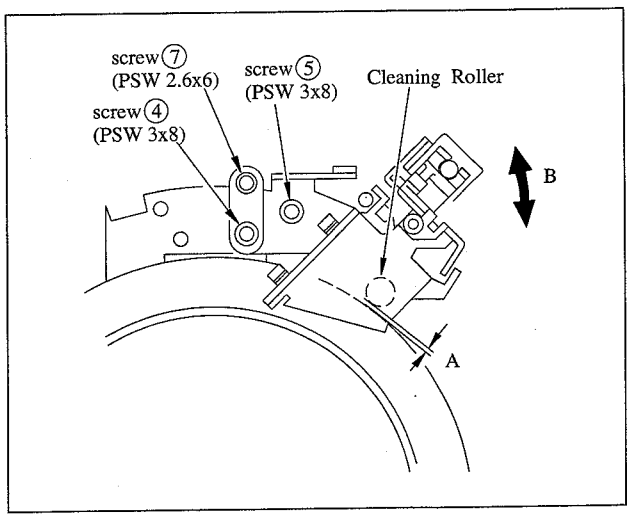


Fig. 6-7-5 Cleaning Roller Position Adjustment

6-8. REEL TABLE ASS'Y COMPONENT REPLACEMENT

Basic Knowledge

A. This section describes the replacement of the component parts below.
   6-8-1. Reel Motor Ass'y Component Replacement
   6-8-2. Reel Brake Ass'y Component Replacement
   6-8-3. Motor Frame Ass'y Component Replacement

B. The Reel Table Ass'y is composed of two assemblies. One is the supply side, and the other is the take-up side. The replacement procedures of these assemblies are the same. The replacement procedures of the supply side are described below.

C. Remove the Cassette Compartment when the component parts are replaced or adjusted. For the removal and installation, refer to section 6-2.

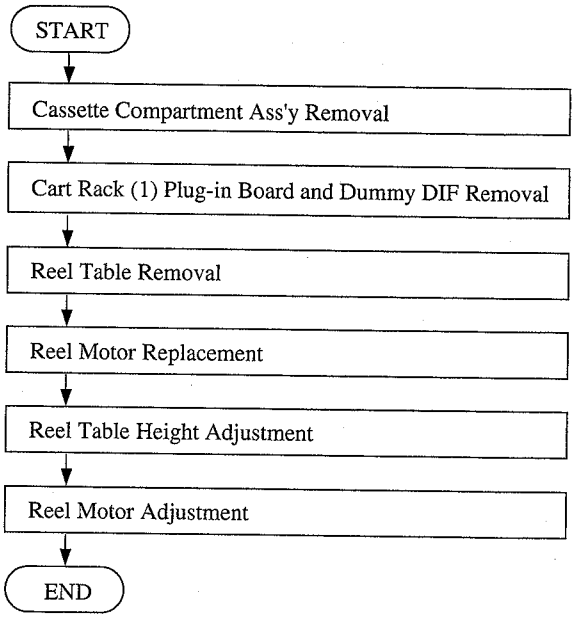
6-8-1. Reel Motor Ass'y Component Replacement

Basic Knowledge

A. Refer to section 6-1 before replacement and prepare for the component part replacement.

B. Prepare the following tools for replacement:
   • Reel Table Height Adjustment Tool
     Sony Part No.: J-6252-190-B
   • Reference Plate
     Sony Part No.: J-6257-380-A
   • Cleaning Fluid (or the equivalent)
     Sony Part No.: 9-919-573-00
   • Cleaning Piece
     Sony Part No.: 2-034-697-00

C. The replacement flowchart is shown below:



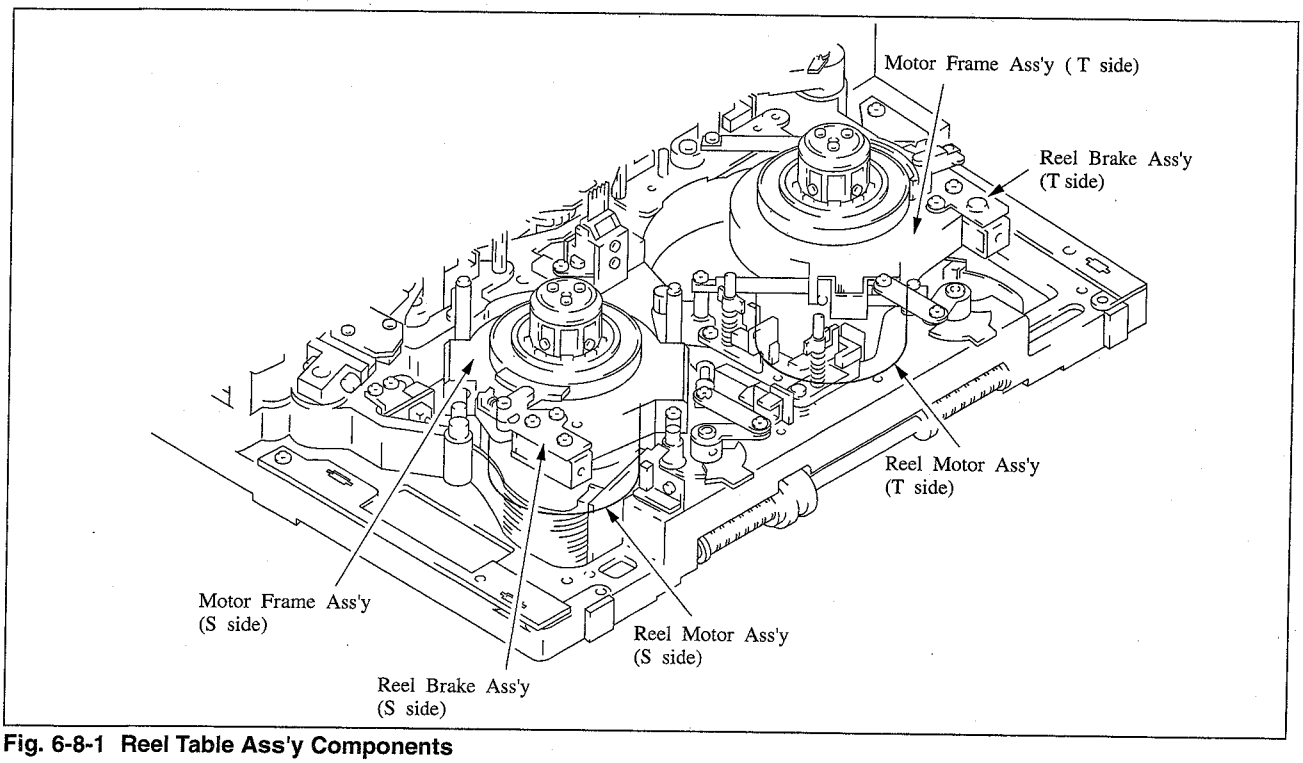


Fig. 6-8-1 Reel Table Ass'y Components

Replacement

1. Remove the Cassette Compartment Ass'y.
   Refer to section 6-2.
2. Removal of the card rack (1) plug-in board and dummy DIF.
   Refer to section 2-6.
3. Reel table removal.
   Loosen the setscrews shown in Fig. 6-8-1 and extract the reel table just above.
4. Reel motor replacement
   (1) Set the Reel Table Ass'y to the S cassette position.
   (2) Remove the Flexible Card Wire shown in the figure from the motor board.
   (3) Remove the harness of a reel brake solenoid from the motor board.

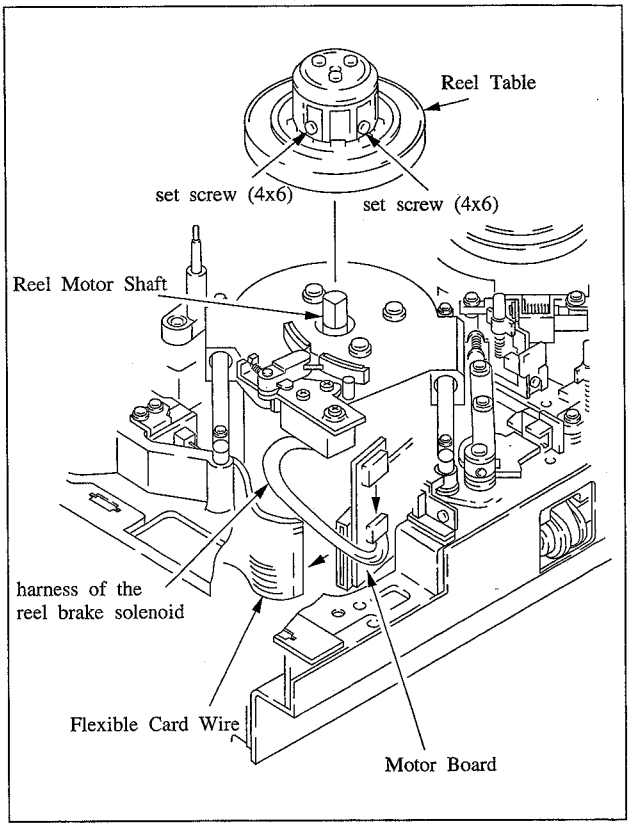


Fig. 6-8-2 Reel Table Removal

(4) Remove four of screw ① shown in Fig. 6-8-2, then remove the Reel Motor from under the base plate.

Note: A spacer may be inserted in surface A (tap position) of the Reel Motor to obtain the shaft perpendicularity. Insert a same spacer in the same tap position of a motor to be replaced.

(5) Clean the contact surface of the Reel Motor to be replaced and the motor frame with cloth moistened with cleaning fluid. After cleaning, wipe it with dry cloth two or three times.
(6) Install the Reel Motor in the reverse order of steps (1) through (4).

Note: Be careful not to bend the flexible card wire during installation.

5. Reel table installation
   (1) Clean the contact surface of the Reel Motor Shaft and the new reel table to be replaced with cloth moistened with cleaning fluid. After cleaning, wipe it with dry cloth two or three times.
   (2) Align the screw holes of the reel table with the cut surface (two) at the tip of the motor shaft, then install the reel table.
   (3) Confirm that the outer circumference surface of the reel table touches the brake shoe of the Reel Brake Ass'y.

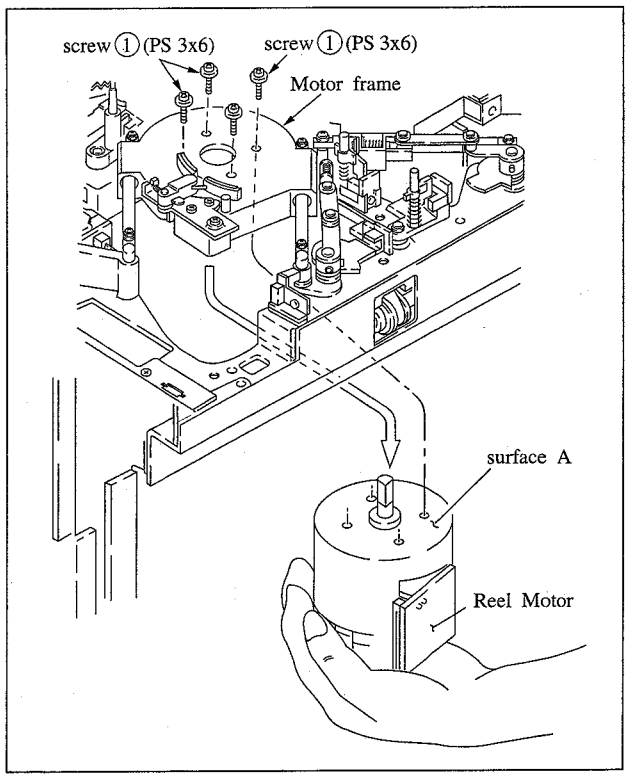


Fig. 6-8-3 Reel Motor Removal

6. Reel table height adjustment

Basic Knowledge

Clean the mounting surface of a reference plate and base plate and the adjustment surface of a reel table height adjustment tool with cloth moistened with cleaning fluid, then set the tool.

Adjustment

(1) Set the reel table to the M cassette position. Refer to section 6-4.

(2) Set the reference plate and reel table height adjustment tool to the machine. (Fig. 6-8-4)

(3) Loosen two of screw ① by one to two turns.

(4) Rotate the reel table with a finger by one turn. Adjust screw ② shown in the figure so that the specification below is met at that time. (Fig. 6-8-3)

Specification: Side A of the tool contacts with the Reel Sheet surface.
Side B of the tool does not contact with the Reel Sheet surface.

(5) Tighten two of screw ① while pressing the reel table in the direction indicated by arrow C. Remove the Tool.

(6) Confirm that the specification is met. If it is, perform steps.(7). If not, perform steps (3) and later.

(7) Remove the tool.

7. Install the Cassette Compartment.
8. Install the card rack (1) plug-in board and dummy DIF.
9. Perform the reel motor adjustment referring to section 10-6.

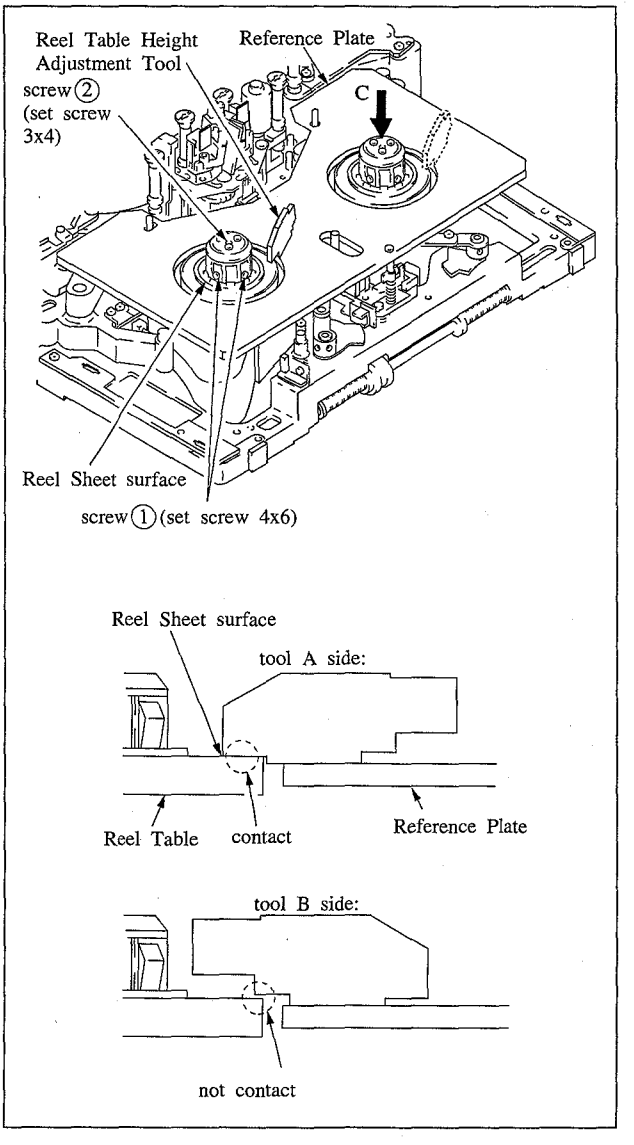


Fig. 6-8-4 Reel Table Height Adjustment

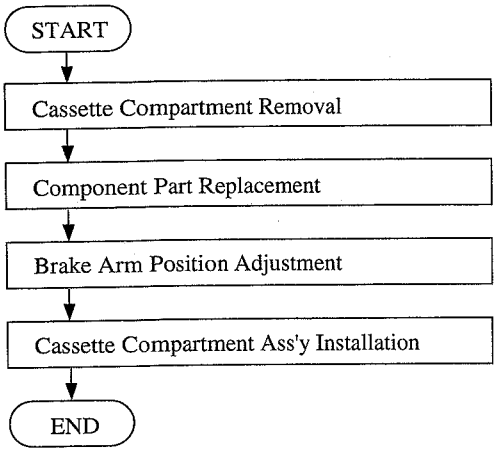
6-8-2. Reel Brake Ass'y Component Replacement

Basic Knowledge

A. The tension spring in the component parts may be damaged when a Brake Arm is replaced. Replace the tension spring simultaneously with during Brake Arm replacement.

B. Perform the reel brake solenoid replacement referring to this procedure.

C. The replacement flowchart is shown below:



Replacement

1. Remove the Cassette Compartment referring to section 6-3.
2. Remove two of screw ① shown in the figure, then remove the Reel Brake Ass'y from the Motor Frame Ass'y.
3. Remove the harness of a reel brake solenoid from the motor board.
4. Replace and assemble the part that requires the replacement of the Reel Brake Ass'y.
5. Temporarily install the Reel Brake Ass'y in the Motor Frame Ass'y with two of screw ①.

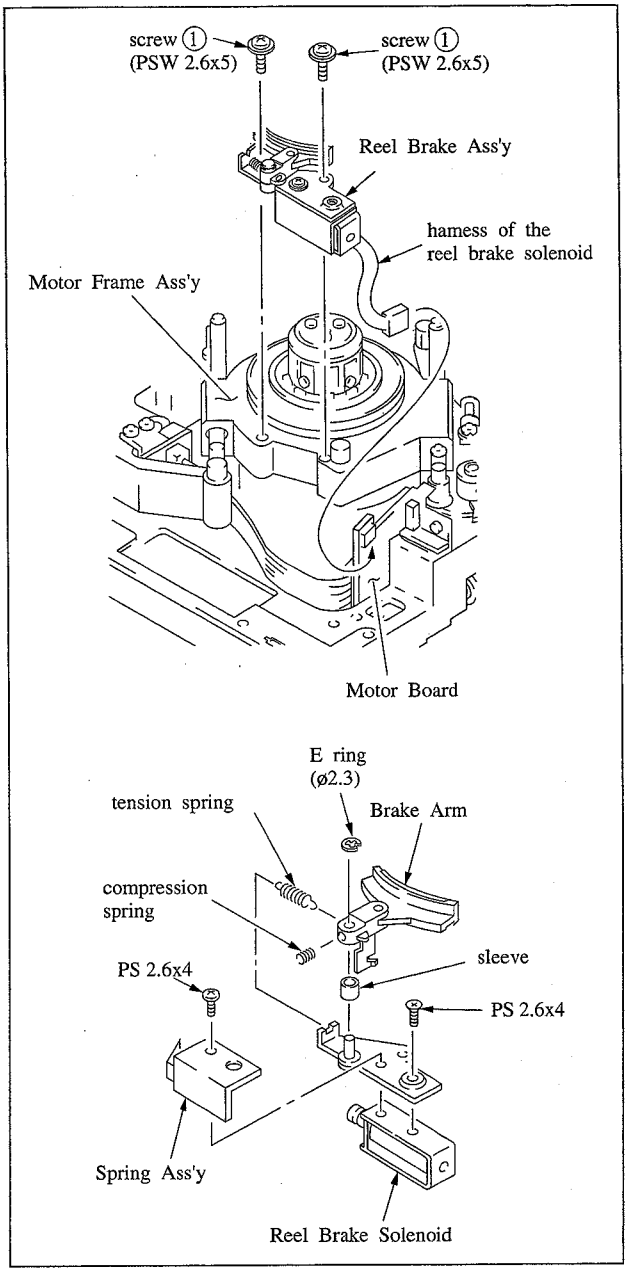


Fig. 6-8-5 Reel Brake Ass'y Replacement

6. Brake Arm position adjustment (Fig. 6-8-6)
   (1) Loosen screws ① and ② (temporarily fixed in step 5).
   (2) Move the Reel Brake Ass'y and adjust so that the Brake Arm touches the hole shown in the figure. Then, tighten screws ① and ② .
   (3) Confirm that the specification below is met.
   Specification:
   Supply side: The area exceeding a half of the hole is hidden when the reel table rotates clockwise (in the direction of arrow A).
   Take-up side: The area exceeding a half of the hole is hidden when the reel table rotates counterclockwise.
   If the specification is met, perform steps (5) and later.
   If it is not, perform steps (4) and later.
   (4) Loosen screws ① and ② and move the Reel Brake Ass'y in the direction indicated by arrow B (clockwise for the take-up side) to meet the specification.
   (5) After the specification is met, tighten screws ① and ② again and confirm that the specification is met.
7. Install the Cassette Compartment Ass'y.

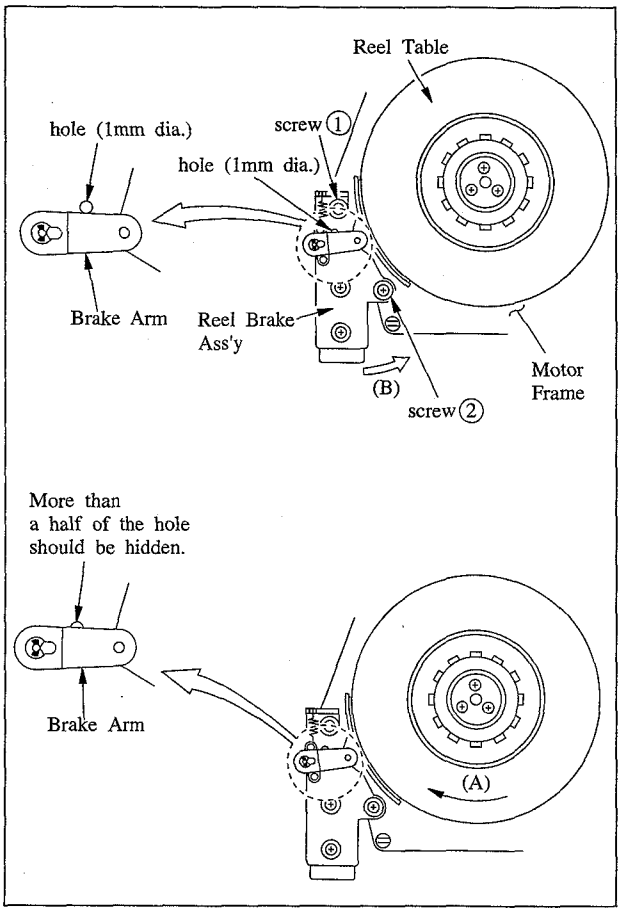


Fig. 6-8-6 Brake Arm Position Adjustment

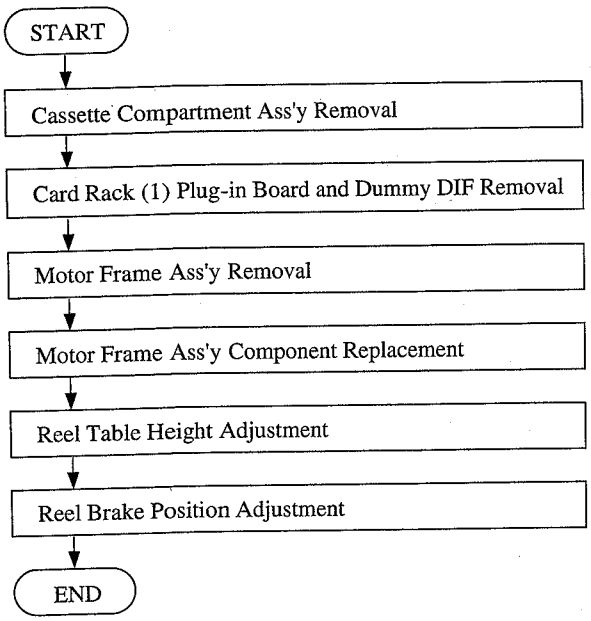
6-8-3. Motor Frame Ass'y Component Replacement

Basic Knowledge

A. Refer to section 6-1 before replacement and prepare for the component part replacement.

B. Prepare the following tools for replacement and adjustment:
- Reel Table Height Adjustment Tool
  Sony Part No.: J-6252-190-B
- Reference Plate
  Sony Part No.: J-6257-380-A
- Cleaning Fluid (or the equivalent)
  Sony Part No.: 9-919-573-00
- Cleaning Piece
  Sony Part No.: 2-034-697-00
- Molytone Grease
  Sony Part No.: 7-662-001-41

C. The replacement flowchart is shown below:



Replacement

1. Cassette Compartment Ass'y removal
   Refer to section 6-2.
2. Card rack (1) plug-in board and dummy DIF removal
   Refer to section 2-6.
3. Set the Motor Frame Ass'y to the S cassette position.
   Refer to section 6-1-4.
4. Motor Frame Ass'y removal
   (1) Remove the flexible card wire from the motor board.
   (2) Remove E ring ① shown in Fig. 6-8-7, then remove crank arm (B) from the Crank Arm Ass'y.

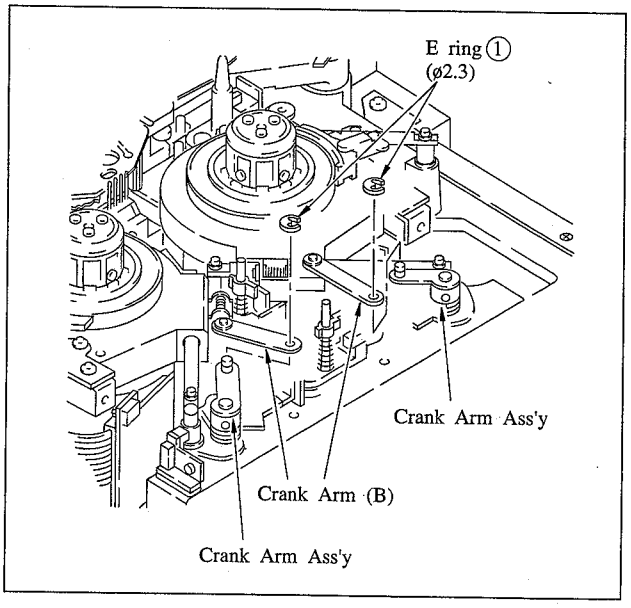


Fig. 6-8-7 Motor Frame Ass'y Removal (1)

(3) Remove screws ① and ②, raise the Motor Frame Ass'y just above, then remove it. (Fig. 6-8-8)

Note: Do not tilt the Motor Frame Ass'y when it is raised. A shift shaft may then come off.

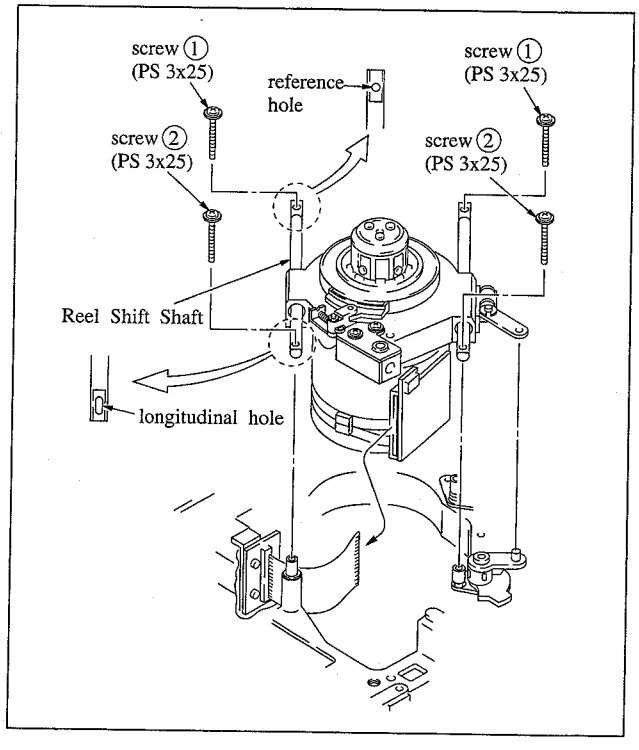


Fig. 6-8-8 Motor Frame Ass'y Removal (2)

5. Replace the part that requires the replacement of the Motor Frame Ass'y.
6. Perform the assembly in the reverse order.
   Position the side of screw ① shown in Fig. 6-8-7 to the shift shaft installing reference hole and the side of screw ② to the longitudinal hole of the shift shaft when the shift shaft is installed.
   The installation procedures are as follows:
   (1) Temporarily fix screws ① and ② to the base plate.
   (2) Move the Reel Table Ass'y manually and set it to the S cassette position.
   (3) Tighten two of screw ①.
   (4) Move the Reel Table Ass'y manually and set it to the M cassette position.
   (5) Tighten two of screw ②.
   (6) Move the Reel Table Ass'y manually and confirm that it is smoothly shifted to the M/S cassette position.
   (7) Install crank arm (B) in the Crank Arm Ass'y with E ring ①.
   (8) Install the flexible card wire in the motor board.
   Note: Be careful not to bend the flexible card wire during installation.
7. Reel table height adjustment
   Refer to step 6 of section 6-8-1.
8. Brake arm position adjustment
   Refer to step 6 of section 6-8-2.
   This adjustment is required only when the Reel Brake Ass'y is removed.
9. Install the Cassette Compartment.
10. Install the card rack (1) plug-in board and dummy DIF.

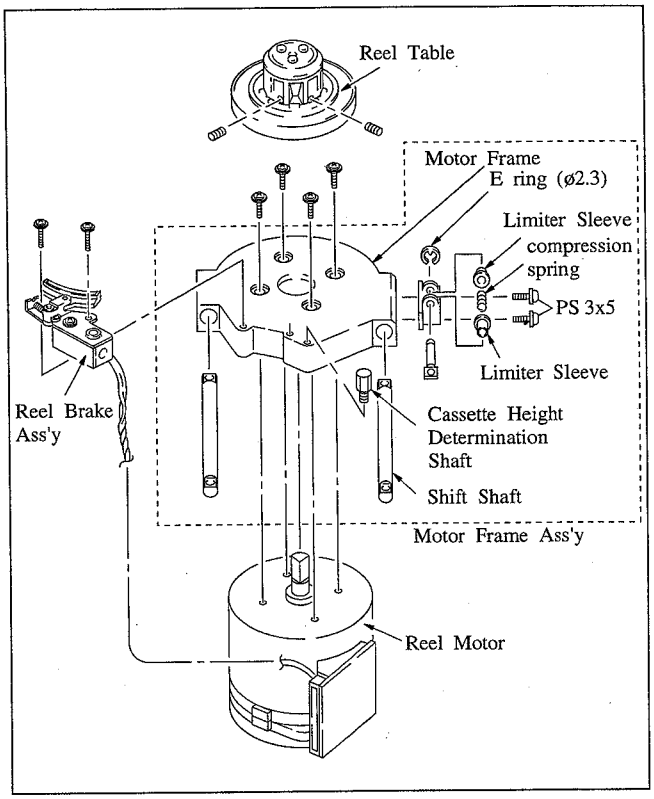


Fig. 6-8-9 Motor Frame Ass'y Component Parts Replacement

6-9. REEL SHIFT DRIVE COMPONENT REPLACEMENT

Basic Knowledge

A. The replacement of the reel shift drive component is described in accordance with the blocks below. (Fig. 6-9-1)
   6-9-1. Reel Shift Shaft Ass'y and Reel Shift Motor Ass'y
   6-9-2. Crank Arm S/T Ass'y
   6-9-3. Crank Arm Shaft Ass'y

B. Remove the Cassette Compartment Ass'y to perform the part replacement above. For the removal and installation, refer to section 6-2.

C. The part replacement in sections 6-9-1 and 6-9-3 is performed as described below.
   (1) Remove the Cassette Compartment Ass'y, then turn the power block upside down and lay the machine on its side. Remove the bottom plate and perform the part replacement.
   (2) Return the machine to the former state before performing the adjustment.

D. Prepare the following tools for replacement and adjustment:
   • Wire Gauge
     Sony Part No.: J-6152-450-A
   • Molytone Grease
     Sony Part No.: 7-662-001-41 or the equivalent
   • Cassette Compartment Position Adjustment Driver (4x240)
     Sony Part No.: 7-721-052-01

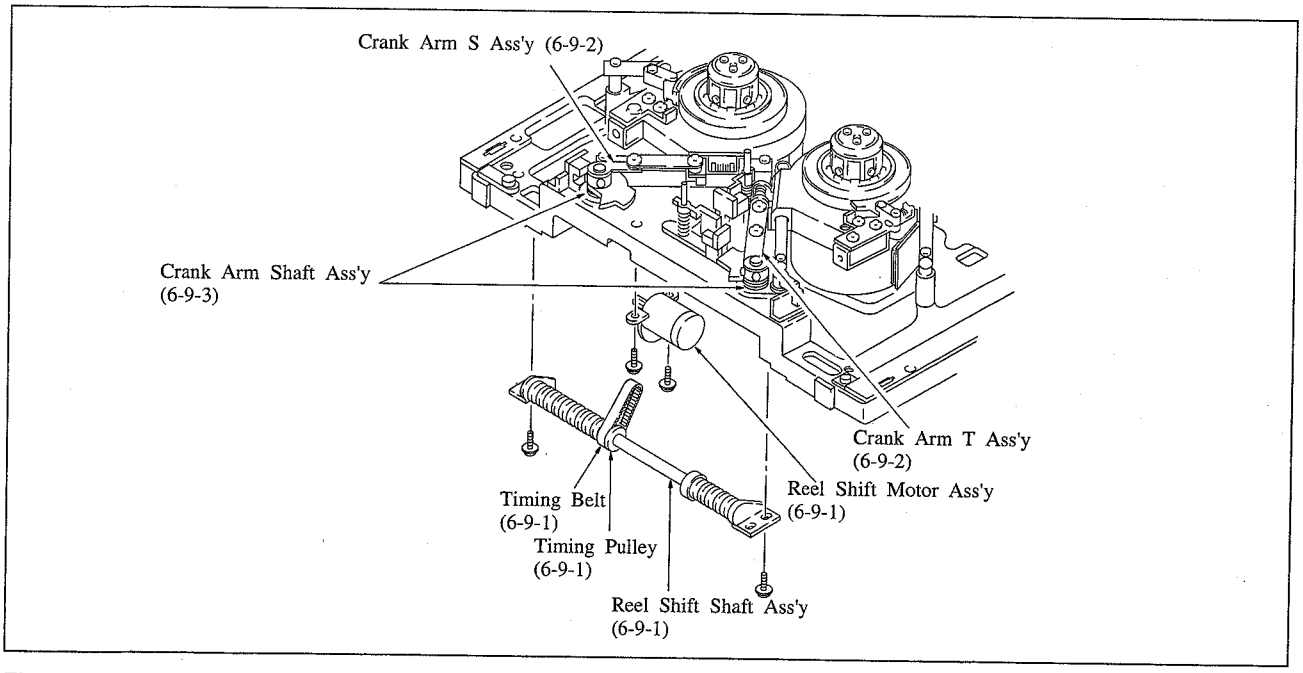


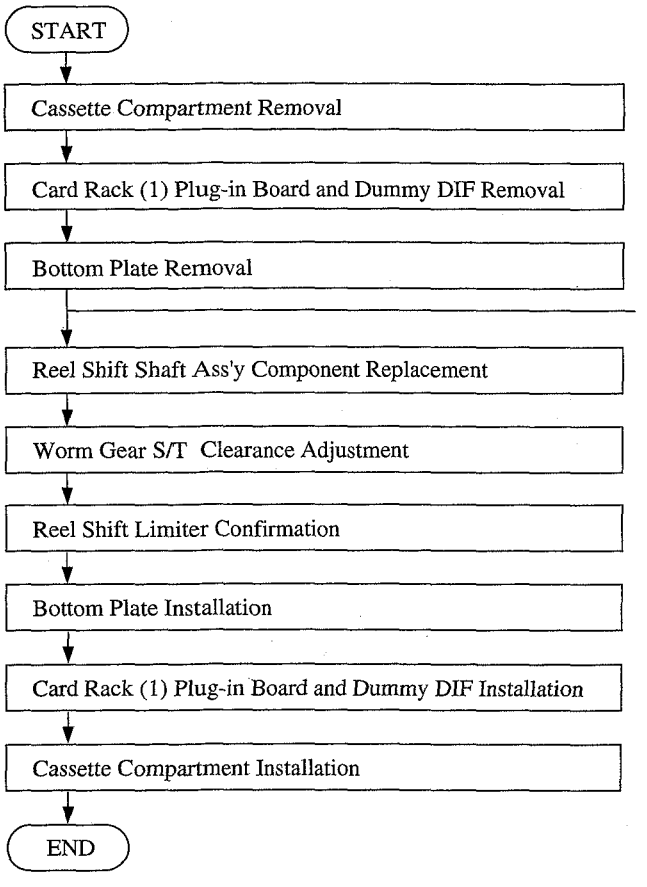
Fig. 6-9-1 Reel Shift Drive Components

6-9-1. Replacement of Reel Shift Shaft Ass'y and Reel Shift Motor Ass'y

Basic Knowledge

A. Refer to the basic knowledge in section 6-9 before replacement and prepare for the part replacement.

B. The replacement flowchart is shown below:



Removal

1. Cassette Compartment Ass'y removal
   Refer to section 6-2.
2. Card rack (1) plug-in board and dummy DIF removal
   Refer to section 6-5.
3. Base plate fixing screw removal (Fig. 6-9-2)
   Remove two of screw ① shown in the figure.
4. Bottom plate removal
   Turn the power block upside down and lay the machine on its side. Then, remove the bottom plate. (Refer to section 6-3.)

   Note: Be careful not to shock the machine when it is laid on its side.

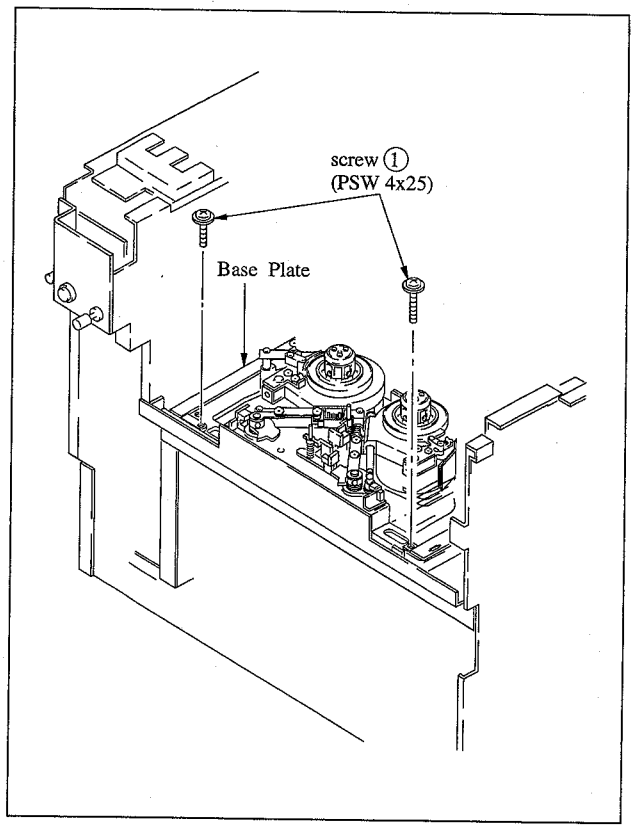


Fig. 6-9-2 Base Plate Fixing Screw Removal

5. Frame ① removal (Fig. 6-9-3)
   Remove four of screw ② , then remove frame ①.

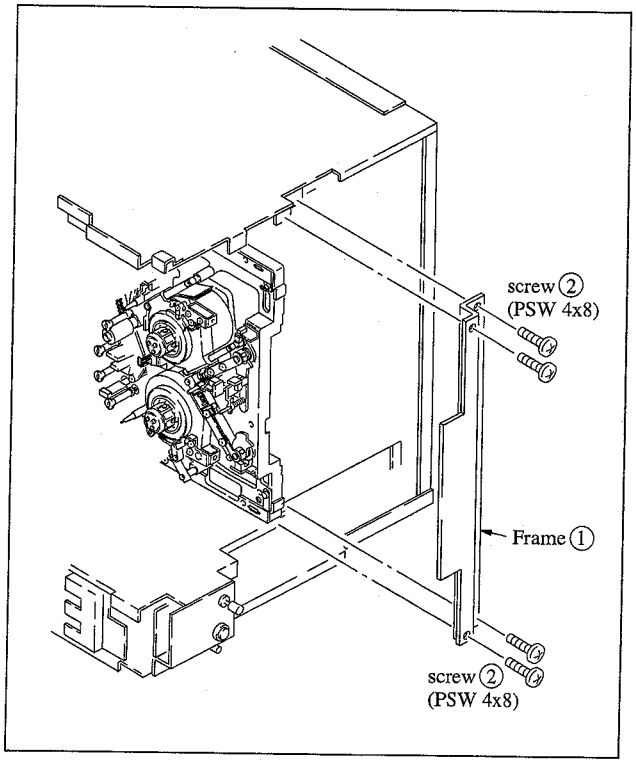


Fig. 6-9-3 Frame ① Removal

Replacement/Installation

6. Reel Shift Motor Ass'y replacement
   (1) Remove two screws e using a cassette compartment position adjustment driver, then remove the Reel Shift Motor Ass'y.
   (2) Replace the component part that requires the replacement. (Fig. 6-9-5)
   (3) Pass a timing belt through the gear of the Reel Sift Motor Ass'y and install it in the base plate.
   (4) Install each part in the reverse order of steps 1 through 5.
7. Reel Shift Shaft Ass'y replacement (Fig. 6-9-4)
   (1) Remove two of screw ④ using a cassette compartment position adjustment driver, then remove the Reel Shift Shaft Ass'y.
   (2) Replace the component part that requires the replacement. (Fig. 6-9-5)
   (3) Set the Motor Frame Ass'y to the S-size position, press the joint block of the Crank Arm S/T Ass'y shown in Fig. 6-9-4 in the direction of arrow A, and make the joint block straight.
   (4) Put a timing belt on the timing pulley of the Reel Shift Shaft Ass'y.

   Note: Take care that grease does not attach to the timing belt. If so, clean the belt and remove the grease.

   (5) Install the Reel Shift Shaft Ass'y in the base plate with two of screw ④. (Temporarily fix the screws.)
   (6) Perform the adjustment in steps 8 and later.

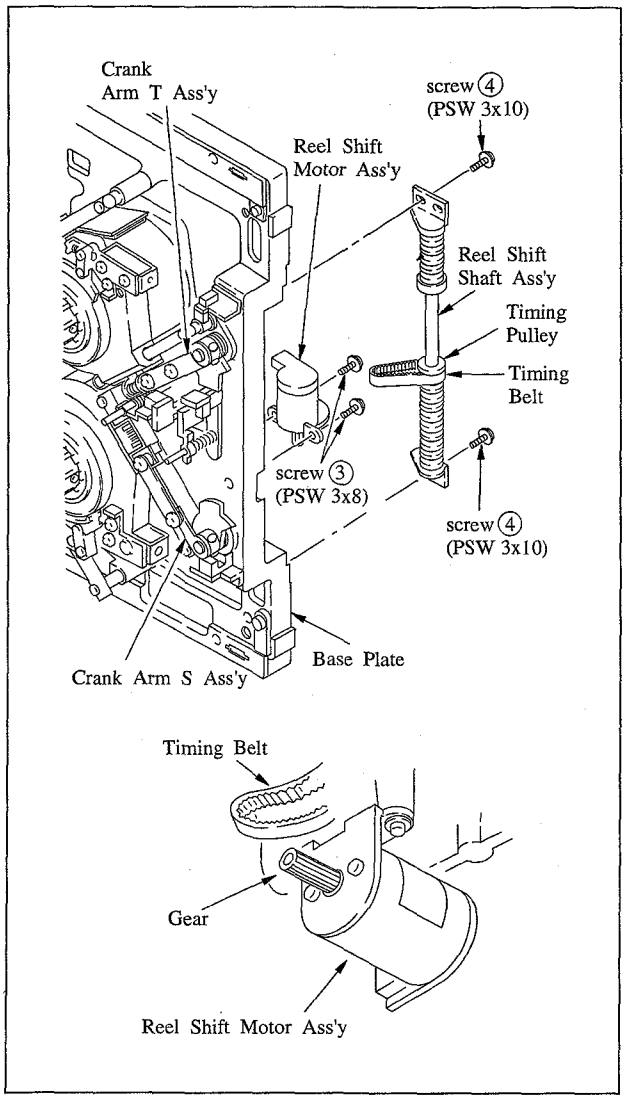


Fig. 6-9-4 Reel Shift Motor Ass'y/ Reel Shift Shaft Ass'y Removal

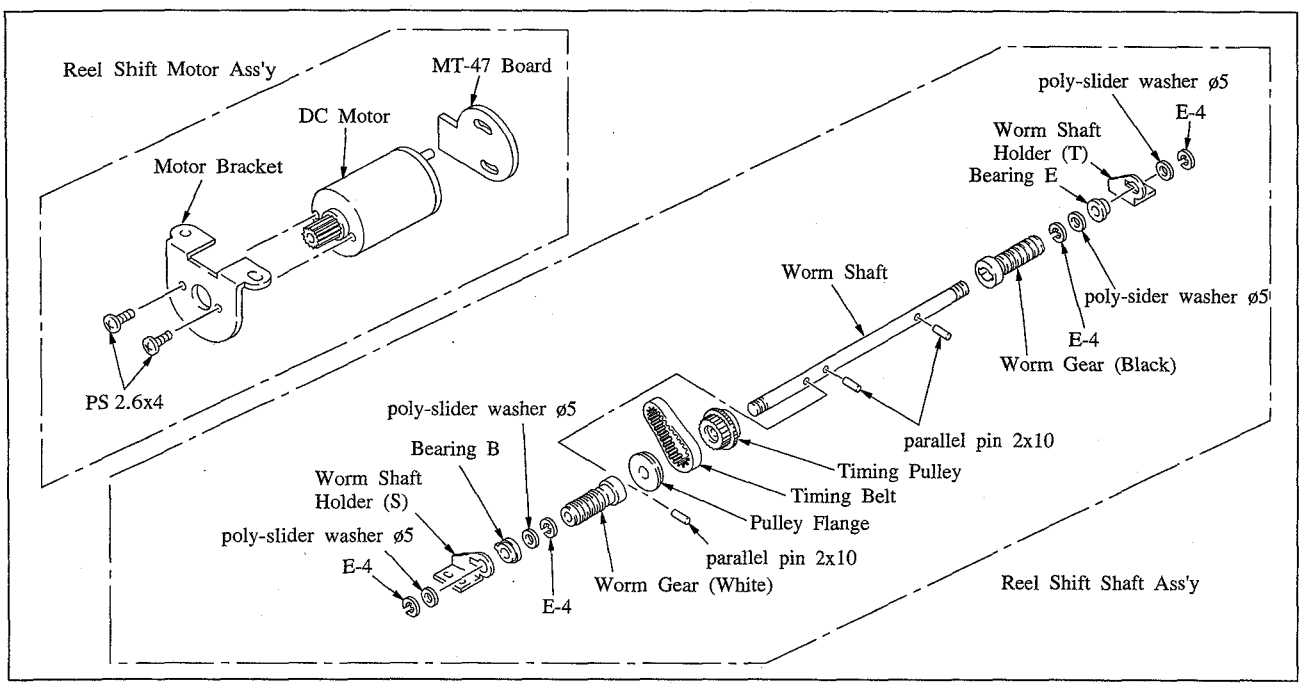


Fig. 6-9-5 Reel Shift Motor Ass'y/ Reel Shift Shaft Ass'y Components

Adjustment

8. Reel shift worm gear S/T clearance adjustment
   - Perform the adjustment on the supply side first, then on the take-up side.
   (1) Insert a wire gauge of 0.4 mm dia. into the engagement portion of worm gear S and worm wheel S.
   (2) Press worm gear S slightly in the direction indicated by arrow A.
   (3) Pull out the wire gauge and insert a wire gauge of 0.3 mm dia. into the same portion. Confirm that the wire gauge is smoothly inserted at that time.
   (4) Change the wire gauge from 0.3 to 0.5 mm dia. Confirm that the wire gauge of 0.3 mm dia. cannot be inserted into the same portion.
   (5) Perform the same adjustment as in steps (1) through (4) for worm gear T.
   (6) Tighten two of screw ④.
   (7) Reconfirm steps (3) and (4) for worm gears S and T.
9. Rotate the timing belt with a finger and confirm that it rotates smoothly.
10. Smear Molytone grease properly to the engagement portion of worm gear S/T and worm wheel S/T.

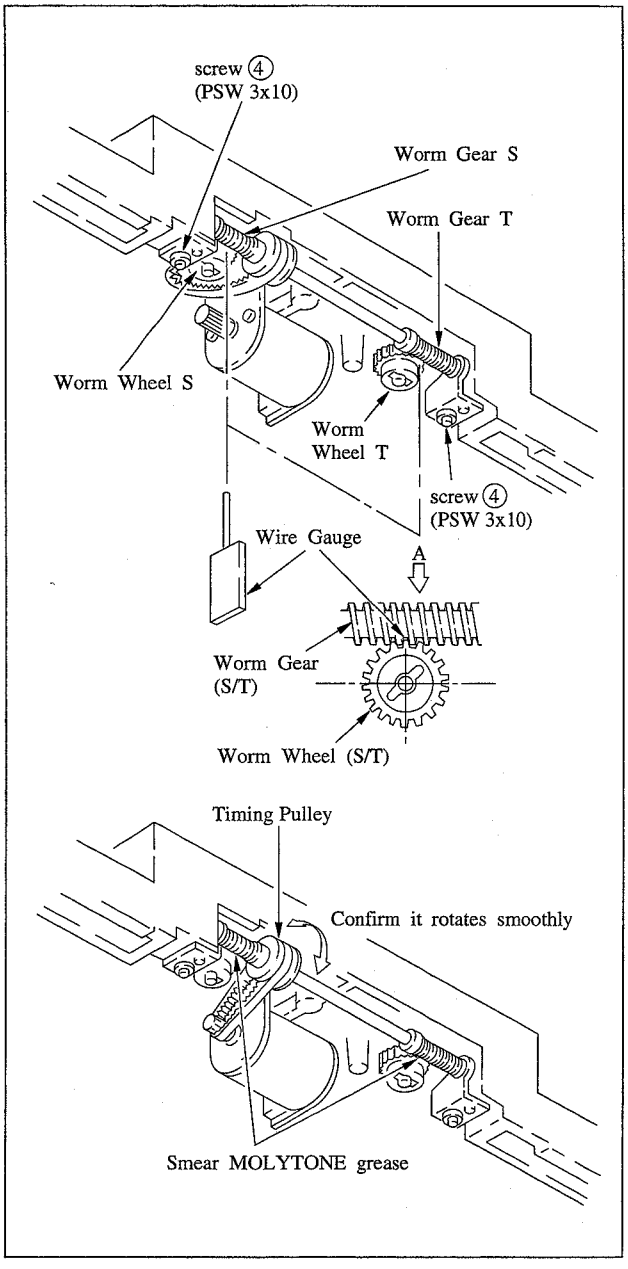


Fig. 6-9-6 Reel Shift Warm Gear S/T Clearance Adjustment

Installation

11. Install in the reverse order of steps 2 through 5.
    - Frame ① and bottom lid installation
    - Return the machine to the horizontal state.
    - Install the base plate with two of screw ①. (Refer to Fig. 6-9-2.)
    - Card rack (1) plug-in board and dummy DIF installation
12. Reel table limiter confirmation
    (1) Turn the timing pulley and set the reel table to the S cassette position.
    (2) Confirm that crank arm S/T is straight. Then, perform steps (4) and later to meet the specification.
    (3) If crank arm S/T is not straight, loosen the setscrew fixing the crank arm. After that, press the joint block in the direction of arrow A as shown in Fig. 6-9-7, make the shift arm straight, and tighten the setscrew.
    (4) Confirm the contraction value (Cs, Ct) of a spring of the limiter on the supply and take-up sides shown in Fig. 6-9-8.

    Specification: Cs, Ct ≧ 1.0 mm

    (5) Turn the timing pulley and set the reel table to the M cassette position.
    (6) Confirm the contraction value (Cs, Ct) in the M cassette position.

    Specification: Cs, Ct ≧ 1.0 mm
13. Install the Cassette Compartment Ass'y.
    Refer to section 6-2.

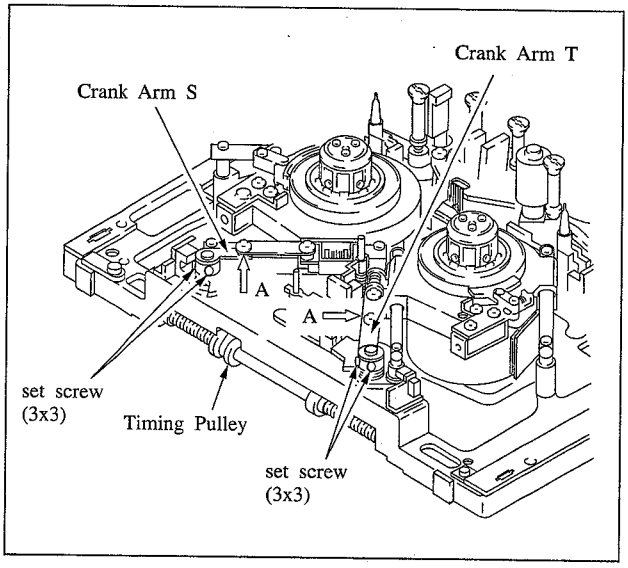


Fig. 6-9-7 Crank Arm S/T Position Confirmation

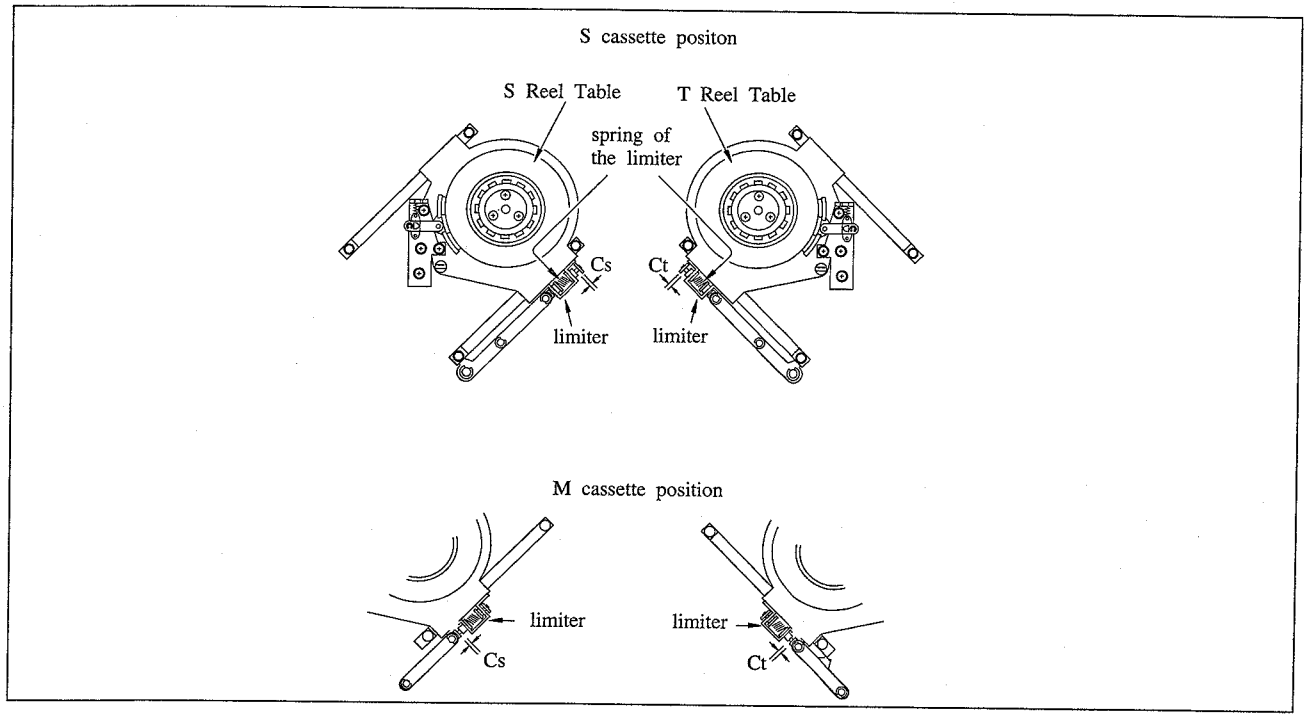


Fig. 6-9-8 Reel Shift, Limiter Confirmation

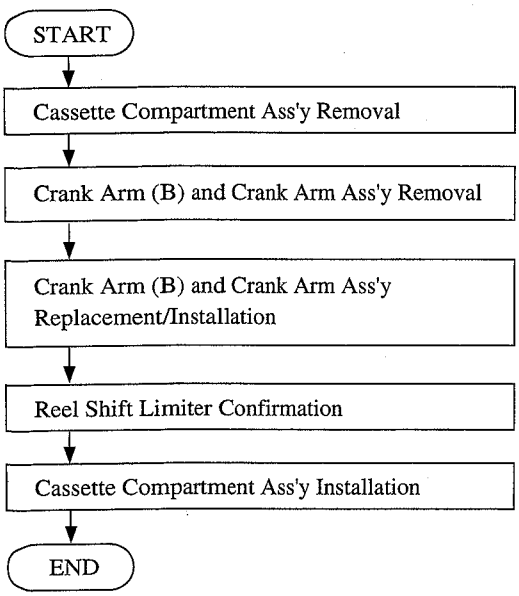
6-9-2. Crank Arm S/T Ass'y Replacement

Basic Knowledge

A. Refer to the basic knowledge in section 6-9 before replacement and prepare for the part replacement.

B. The replacement procedure of the Crank Arm S Ass'y component part is the same as that of the Crank Arm T Ass'y component part. The replacement procedures of the S/T Ass'y are described together below.

C. The replacement flowchart is shown below:



Replacement

1. Cassette Compartment Ass'y removal
   Refer to section 6-2.
2. Crank arm (B) and Crank Arm Ass'y removal
   (Fig. 6-9-9)
   (1) Remove the E ring, then remove crank arm (B).
   (2) Remove two setscrews, then remove the Reel Shift Crank Arm Ass'y.

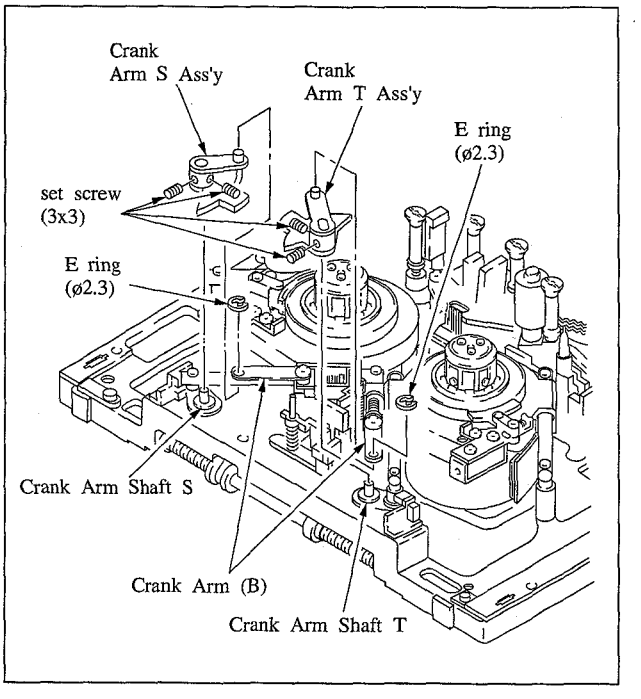


Fig. 6-9-9 Crank Arm Ass'y Removal

3. Reel Shift Crank Arm Ass'y replacement/installation
   (1) Pass a new part through the crank arm shaft and rotate the Crank Arm Ass'y with a finger. Confirm that the Crank Arm Ass'y rotates smoothly at that time. (Do not tighten the setscrews.)
   (2) Install the joint block of crank arm (B) in the Reel Shift Crank Arm Ass'y and fix it with an E ring.
   (3) Press portion (A) shown in Fig. 6-9-10 in the direction indicated by the arrow and make the shift arm straight. Tighten the two setscrews.
4. Reel shift limiter confirmation
   Refer to section 6-9-1.
5. Cassette Compartment Ass'y installation
   Refer to section 6-2.

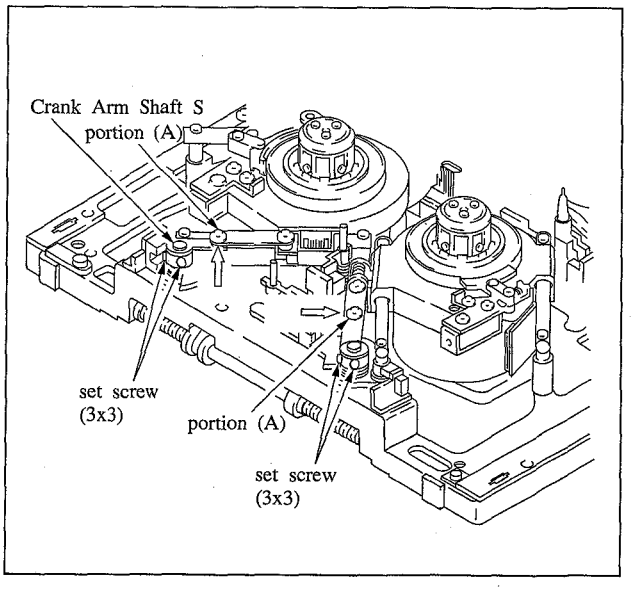


Fig. 6-9-10 Reel Shift Crank Arm Ass'y Installation

6-9-3. Crank Arm Shaft Ass'y Replacement

Basic Knowledge

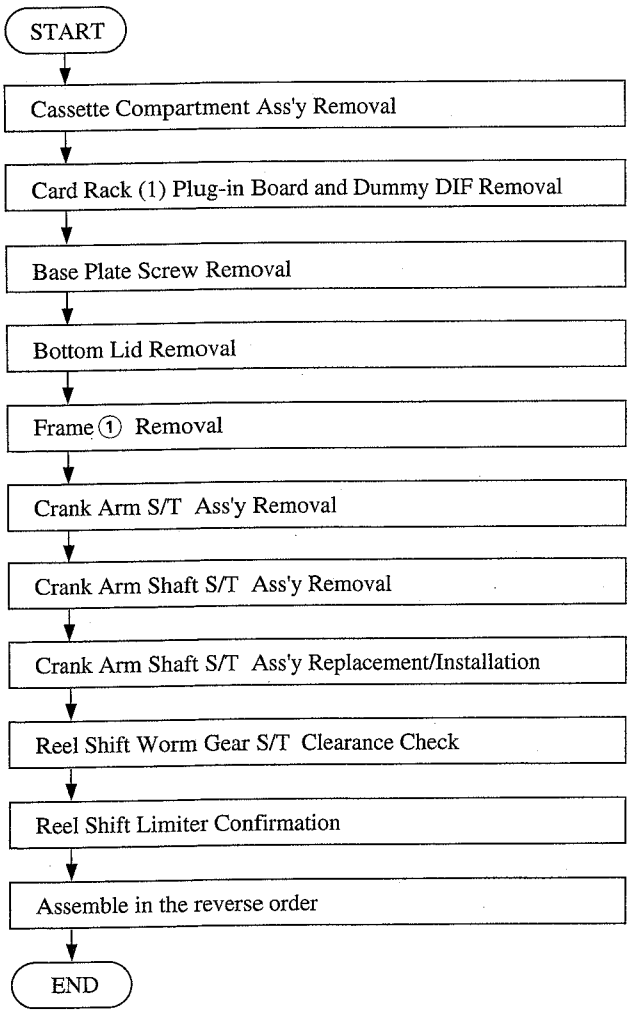
A. Refer to the basic knowledge in section 6-9 before replacement and prepare for the part replacement.

B. The Crank Arm Shaft Ass'y is composed of worm wheels (S/T), a crank shaft, and a parallel pin. Perform in this replacement procedure when part replacement is required as the service part.

C. The replacement procedure of the Crank Arm Shaft S Ass'y component part is the same as that of the Crank Arm Shaft T Ass'y component part. The replacement procedures of the S/T Ass'y are described together below.

D. Set the Motor Frame Ass'y in advance to the S cassette position before replacement.

E. The replacement flowchart is shown below:



Replacement

1. Cassette Compartment Ass'y removal
   Refer to section 6-2.
2. Card rack (1) plug-in board and dummy DIF removal
   Refer to section 6-5.
3. Base plate fixing screw removal
   Refer to step 3 of section 6-9.
4. Bottom lid removal
   Refer to step 4 of section 6-9.
5. Frame ① removal
   Refer to step 5 of section 6-9.

6. Crank Arm S/T Ass'y removal
(Fig. 6-9-11)
Remove E ring ① shown in the figure, loosen two setscrews, then remove the Reel Shift Crank Arm Ass'y.
7. Crank Arm Shaft S/T Ass'y removal
(Fig. 6-9-11)
Remove E ring ② shown in the figure, then remove the Crank Arm Shaft Ass'y. Two poly-washers are then removed together.
8. Crank Arm Shaft S/T Ass'y replacement/installation
   (1) Clean the two crank arm bearings (upper and lower) of the base plate and the new crank arm shaft to be replaced with cloth moistened with cleaning fluid.
   (2) Confirm that no foreign matter attaches to the cleaned contact surface and no flaw exists on the surface. After that, smear Molytone grease properly.
   (3) Install the Crank Arm Shaft Ass'y and Crank Arm Ass'y in the reverse order of steps 6 and 7.

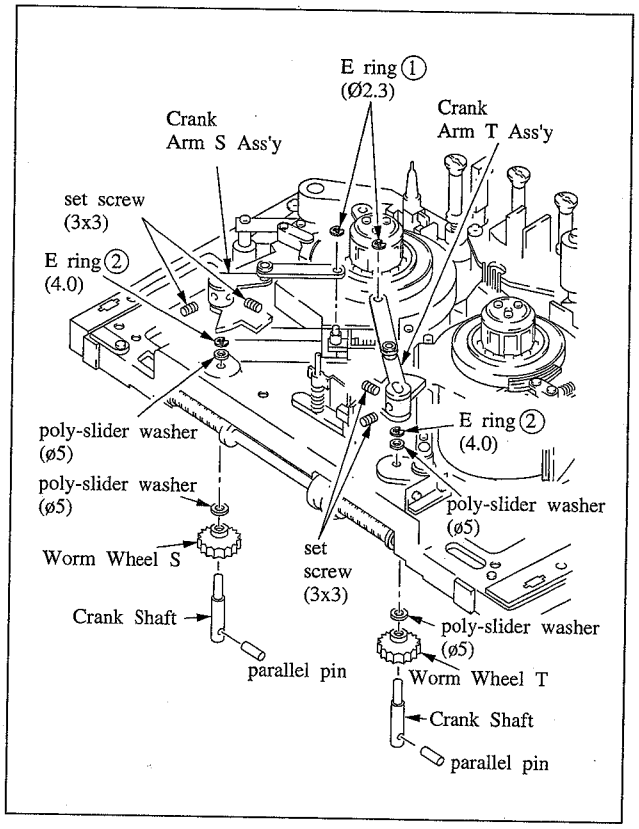


Fig. 6-9-11 Crank Arm Shaft S/T Ass'y Replacement

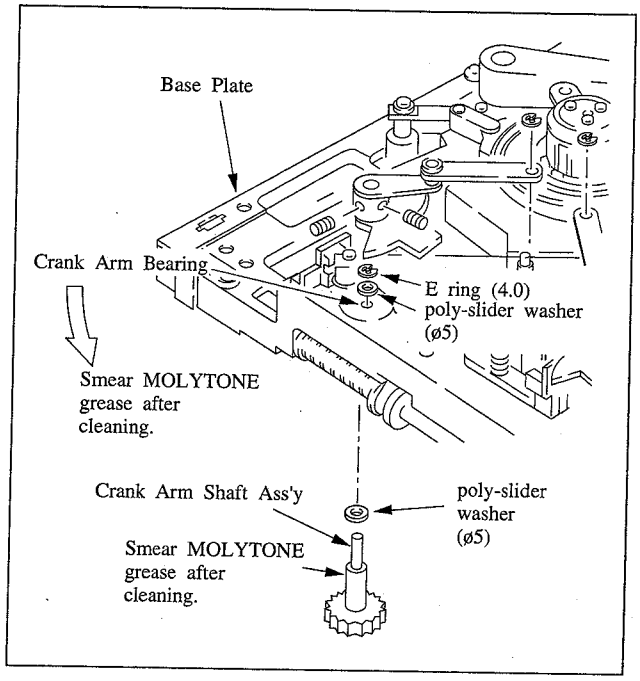


Fig. 6-9-12 MOLYTONE Grease Smearing Position

9. Reel shift worm gear S/T clearance check (Fig. 6-9-13)
   Insert a wire gauge of 0.3 mm dia. into the engagement portion of the worm gear and worm wheel shown in the figure and confirm that it is inserted smoothly. Change the wire gauge from 0.3 mm to 0.5 mm dia. Confirm that the wire gauge of 0.5 mm dia. cannot be inserted into the same portion. If the check above is not met, perform the adjustment in step 9 of section 6-9-1.
10. Reel shift limiter confirmation
    Refer to the reel table limiter confirmation in step 13 of section 6-9-1.

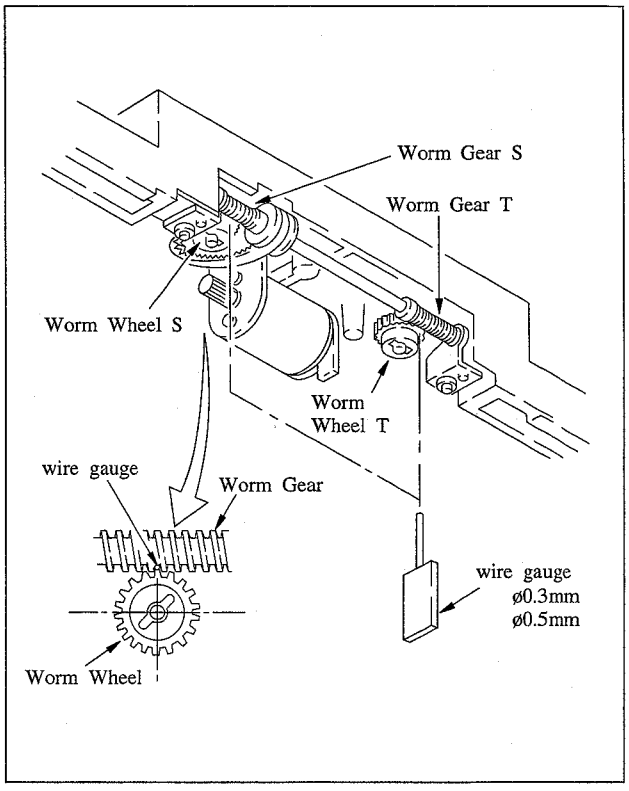


Fig. 6-9-13 Reel Shift Warm Gear S/T Clearance Check

11. Frame ① installation
12. Bottom lid installation
13. Base plate fixing screw installation
14. Card rack ① plug-in board and dummy DIF installation
15. Cassette Compartment Ass'y installationInstall the tools in steps 11 through 15 in the reverse order of steps 1 through 5.

SECTION 7
GENERAL INFORMATION FOR ALIGNMENT

7-1. INDEX OF ALIGNMENT

The list below shows all the adjustments for each printed board together with the relevant section references.

AD-73 board

RV1
RV2
RV3
RV4
RV5
RV6
RV7
RV8
RV9
RV11
RV12
RV13
RV14
RV15
RV16
RV17
RV201
RV203
RV204
RV205
RV207
RV301
RV303
RV304
RV305
RV307
RV401
RV403
RV404
RV405
RV407
RV501
RV503
RV504
RV505
RV507

LV1
LV2

AE-15 board

RV1
RV2
RV3
RV4
RV5
RV6
RV7
RV8
RV9
RV10

(AE-15 board)

RV11
RV12
RV13
RV14
RV15
RV16
RV17
RV18
RV19
RV100
RV101
RV102
RV103
RV104
RV105

LV1
LV2
LV3
LV4
LV5
LV6
LV7
LV8

EQ-29 board

RV101
RV102
RV103
RV104
RV201
RV202
RV203
RV204
RV301
RV302
RV303
RV304
RV305
RV306
RV307
RV308
RV401
RV402
RV501
RV502

LV401
LV501

CT-133 board

RV1 8-6
RV2 8-6

DT-16 board

RV101
RV102
RV103
RV104
RV105
RV106
RV107

ED-24 board

RV1
RV2

LO-14 board

RV101
RV201
RV301
RV401
RV501
RV601

MD-50 board

RV601

PR-157 board

RV1
RV2
RV3
RV4

LV1

RE-42 board

RV1 8-4
RV2 8-5
RV3 8-4
RV4 8-5
RV5 8-4
RV6 8-5
RV7 8-3
RV8 8-3
RV9 8-3
RV10 8-6

REC-11 board

RV101
RV102
RV150
RV201
RV202
RV250
RV301
RV302
RV350
RV401
RV402
RV450

VM-05 board

RV1
RV2
RV3

VR-98 board

RV1

7-2. EQUIPMENT REQUIRED

Oscilloscope

NTSC

PAL

Equivalent product: 2445 or 2465/Tektronix
Band width: more than 150MHz

Digital Voltmeter

Equivalent product: 3435A/Hewlett Packard
Effective digits: more than 5 digits
Acculacy: 0.02% ± 1count

DC Current Meter

Range: 10A

Test Signal Generator

NTSC

Equivalent product: (1) 1410/Tektronix and the following plug-in units
SPG2 SYNC generator
TSG1 Color bar generator
TSG3 Linearity generator
TSG6 Multiburst generator
(2) TSG170D/Tektronix

PAL

Equivalent product: (1) 1411/Tektronix and the following plug-in units
SPG12 SYNC generator
TSG11 Color bar generator
TSG13 Linearity generator
TSG16 Multiburst generator
(2) TSG-273/Tektronix

Vectorscope / Waveform Monitor

NTSC

Equivalent Product: 1750/Tektronix

PAL

Equivalent product: 1751/Tektronix

Waveform Monitor (When used Vectorscope)

Equivalent product: 1485R/Tektronix

Monitor

NTSC

Equivalent product: BVM-1910 or BVM-2010/SONY

PAL

Equivalent product: BVM-2010P/SONY

Audio Oscillator / Analyzer

Equivalent product: TM5006/Tektronix and the following plug-in units
SG5010 Oscillator
AA5001 Analyzer

Spectrum Analyzer

Equivalent product: 8568B/Hewlett Packard

Video Noise Meter

Equivalent product: UPSF2/Rohde & Schwarz

Frequency Counter

Equivalent product: 5315/Hewlett Packard

AC Current Probe

Equivalent product: P6022/Tektronix
Band width: more than 100MHz

Extension Board, EX-341
SONY Part No. A-6001-038-A

This is used for checking and repairing the plug-in boards that are installed in the processor block.(One board is provided.)

Extension Board, EX-185
SONY Part No. A-6001-015-A

This is used for checking and repairing the plug-in boards that are installed in the card rack block.(One board is provided.)

Extension Board, EX-241
SONY Part No. A-6025-144-A

This is used for checking and repairing the REC-11 board.(One board is provided.)

Alignment Tape

NTSC
ER2-2NTSC Mechanical Adjustment
SONY Part No. 8-960-071-12
ER5-2NTSC Electrical Adjustment
SONY Part No. 8-960-071-02

PAL
ER2-2PAL Mechanical Adjustment
SONY Part No. 8-960-071-62
ER5-2PAL Electrical Ajustment
SONY Part No. 8-960-071-52

IC Test Clip
Type TC-16: SONY Part No. J-6041-770-A
Type TC-20: SONY Part No. J-6041-780-A

Manufactured by: AP PRODUCTS INCORPORATED

P.O. Box 697, 72 Corwin Drive,
Painesville, Ohio 44077, U.S.A.
Phone: (216) 354-2101

When connecting the test probe to the terminal of DIP integrated circuit for check or adjustment, these clips are convenient. Type TC-16 is used for DIP 14-pin or 16-pin IC and Type TC-20 for 18-pin or 20-pin IC.

Adjustment Driber 1.3mm(ceramic)
SONY Part No. 7-721-052-81

This is used for adjustment of the variable resistor.

7-3. WAY OF INSCRIBING ELECTRIC ADJUSTMENT PARTS NOTATION

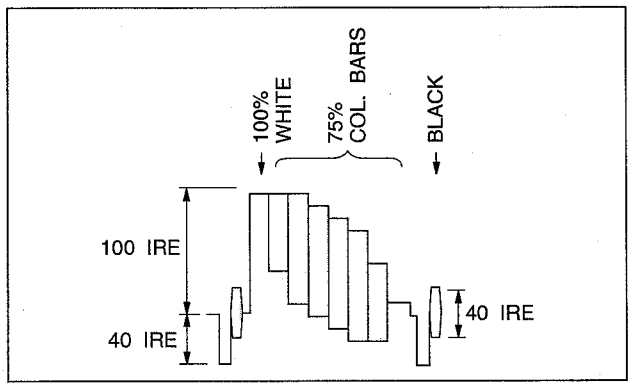
The meaning of reference such as "RV1/PS-187 (E3)" in this manual is as follows:

RV1 → Reference number
PS-187 → Board name
E3 → Location mounted circuit board

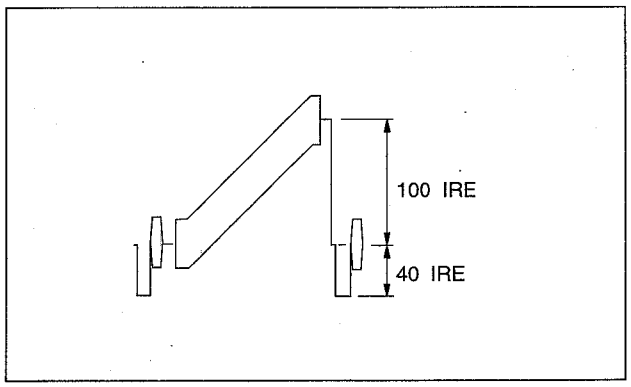
7-4. OUTSIDE TEST SIGNALS (WHEN USING SIGNAL GENERATOR)

• The test signal to be used must conform to the RS-170A standards.

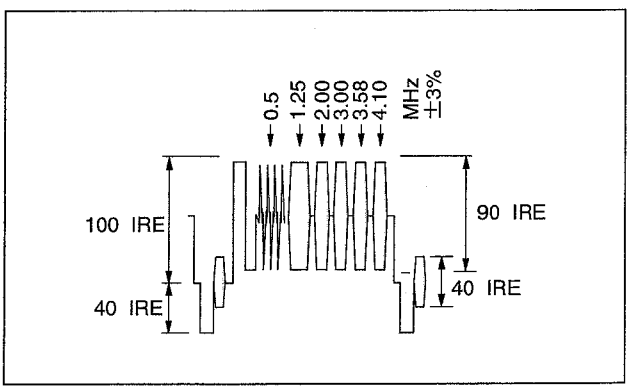
1. COLOR BARS



2. RAMP LENEARITY

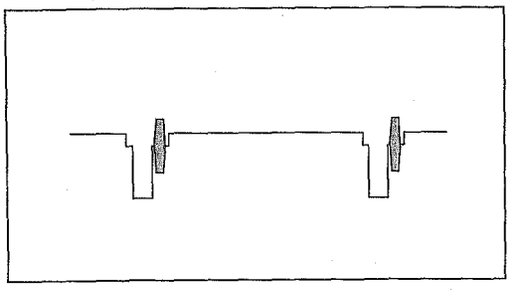


3. MULTIBURST

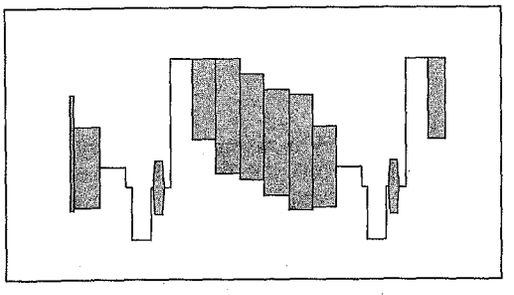


7-5. INSIDE TEST SIGNALS

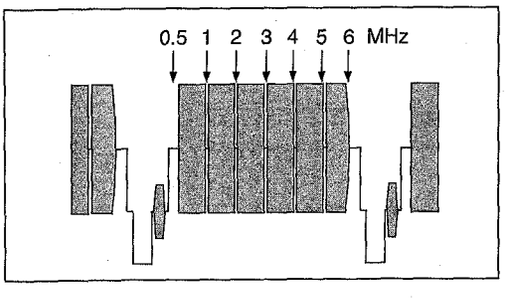
1. BB (Black burst)



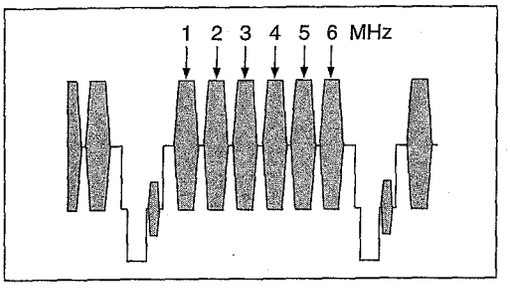
2. CB W/RED (75% Color bars)



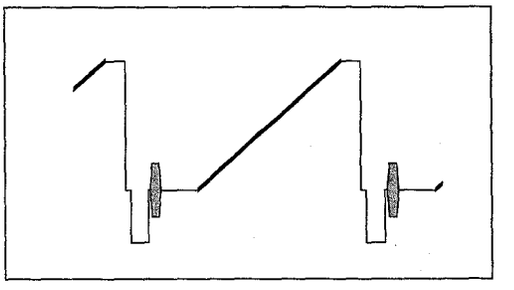
3. SWEEP



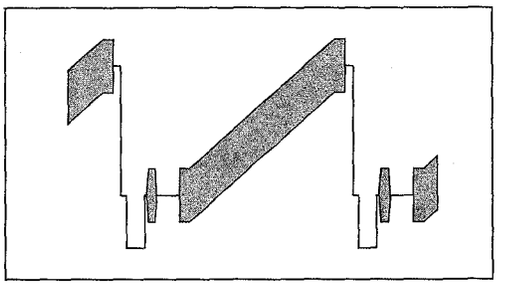
4. MB (Multi burst)



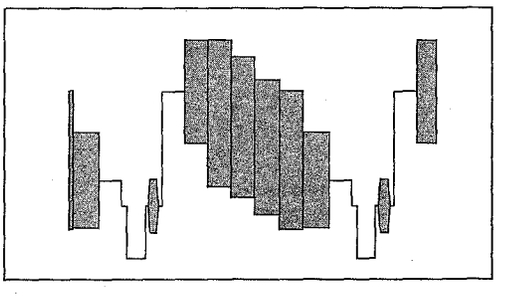
5. Y RAMP



6. MOD RAMP (Modulated ramp)

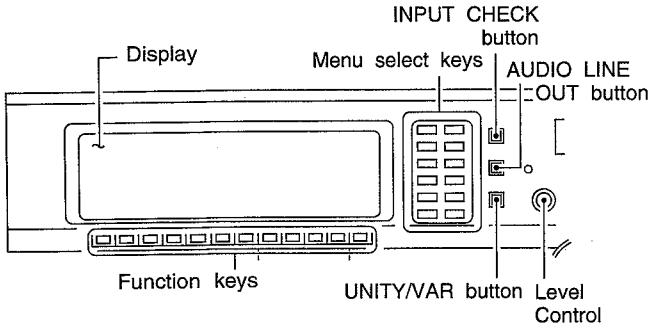


7. CB FULL (100% Color bars)



7-6. HOW TO SET THE MENU

BKDV-101



Set the menu mentioned in the electrical alignment sections as follows:

Example–1:

HOME : F11 (CONTROL) → LOCAL

F3 (REC REF) → INPUT

Example–2:

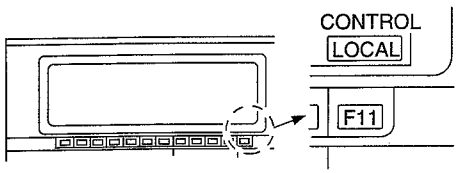
VIDEO IN : F1 (ANALOG V) → UNITY

Example–3:

AUDIO OUT : F7 (MONI L) → Some one of DA-1 to DA-4

Example–1:

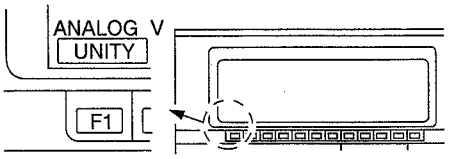
1. Press HOME key in the menu select keys.
   The display is changed to the HOME menu.
2. Press F11 key in the function keys.
   The following display is indicated:



3. Confirm that "LOCAL" is indicated on the display. If "REMOTE" is indicated, press F11 key again to indicate the "LOCAL".
4. Next, press F3 key while pressing F key. Set the menu with the same way as items 2 and 3.

Example–2:

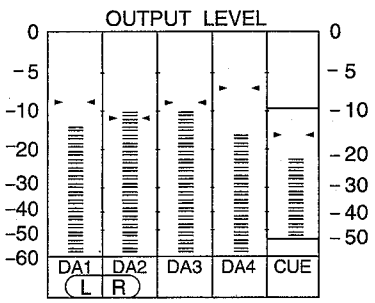
1. Press VIDEO IN key in the menu select keys.
   The display is changed to the VIDEO IN menu.
2. Press F1 key in the function keys.
   The following display is indicated:



3. Confirm that "UNITY" is indicated on the display. If "VTR" is indicated, press UNITY/VAR button to indicate the "UNITY".

Example–3:

1. Press AUDIO OUT key in the menu select keys. The display is changed to AUDIO OUT menu and the Audio Level Meter (OUTPUT LEVEL) is indicated as follows:



2. Press F7 key in the function keys.
   "L" mark moves DA1 → DA2 → DA3 → DA4 → CUE in order. After moving the mark to CUE, it is return to DA1 position again.
   With this way, set the "L" mark to one of DA1 to DA4 positions.

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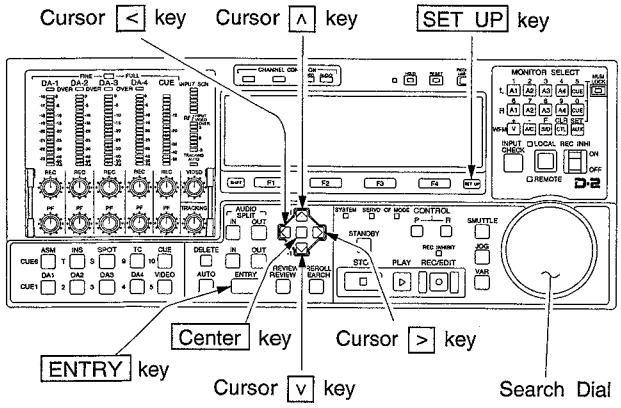
The cursor keys are used to set all menu items. Only menus assigned to function keys can be directly entered by pressing the function keys.



1. Press the keys on the control panel in the following sequence.

   ① SET UP

   ② Scroll through the menus to select the menu to be set.

   (Selection of menu categoly to be set)

   ENTRY + Search dial

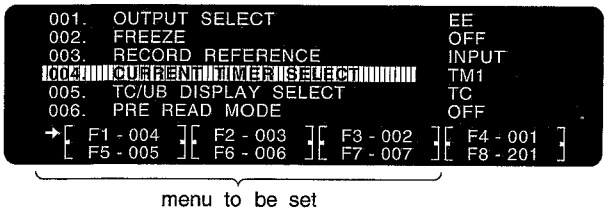
   or ENTRY + ∧ Key and ∨ Key

   (Selection of menu to be set)

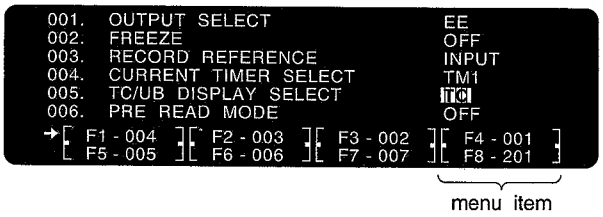
   Search dial

   or ∧ Key and ∨ Key

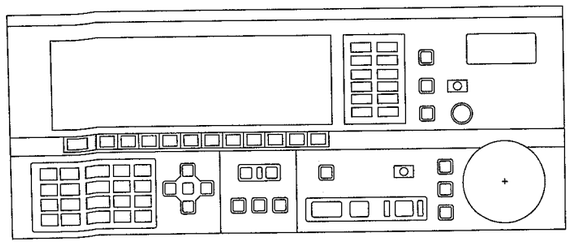
   Note: TEST menu → ENTRY + Center +Search dial



1. Press > key to move to the column on the right where the actual setting is made. The item to be specified is shown in reversed charaters. Select the settings for the menu with the ∧ key and ∨ key, or the search dial.



2. After setting the menu, return to the column on the left by pressing < key.
   (Set other menus in the same way.)
   To terminate a setting operation, press SET UP key.



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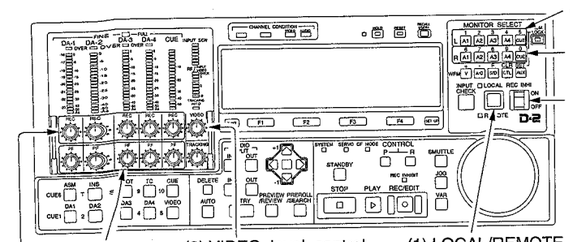


BKDV-201/200

BKDV-101	BKDV-201/200
HOME: [F3] (REC REF) → INPUT [F8] (PRE READ) → OFF [F11] (CONTROL) → LOCAL	[SET UP] [003 RECORD REFERENCE INPUT] [006 PRE READ MODE OFF] LOCAL/REMOTE button → LOCAL (1)
VIDEO IN: [F1] (ANALOG V) → UNITY [F7] (VIDEO) → DIGITAL → ANALOG	Push the VIDEO level control for unity gain. (2) [SET UP] [202 VIDEO LEVEL DIGITAL] [202 VIDEO LEVEL ANALOG]
VIDEO OUT: [F1] (VIDEO) → UNITY [F2] (CHROMA) → UNITY [F3] (HUE) → UNITY [F4] (SET UP) → UNITY [F5] (V PHASE) → UNITY [F11] (CF PULSE) → OUT FRM	[SET UP] [204 VIDEO LEVEL UNITY] [205 CHROMA LEVEL UNITY] [206 HUE, B/C PHASE UNITY] [207 SET UP, BLACK LEVEL UNITY] [208 VIDEO PHASE UNITY] [209 CF PULSE SELECT OUT FRM]
AUDIO IN: [F1] (DA-1) → UNITY [F2] (DA-2) → UNITY [F3] (DA-3) → UNITY [F4] (DA-4) → UNITY [F5] (CUE) → UNITY [F7] (EMPHASIS) → OFF	Push the Audio REC level control, DA-1 for unity gain. (3) Push the Audio REC level control, DA-2 for unity gain. Push the Audio REC level control, DA-3 for unity gain. Push the Audio REC level control, DA-4 for unity gain. Push the Audio REC level control, CUE for unity gain. [SET UP] [303 RECORDING EMPHASIS OFF]
AUDIO OUT: [F1] (DA-1) → UNITY [F2] (DA-2) → UNITY [F3] (DA-3) → UNITY [F4] (DA-4) → UNITY [F5] (CUE) → UNITY [F7] (MONI L) → Any one of DA1~DA4 [F8] (MONI R) → Any one of DA1~DA4	Push the Audio PB level control, DA-1 for unity gain. (4) Push the Audio PB level control, DA-2 for unity gain. Push the Audio PB level control, DA-3 for unity gain. Push the Audio PB level control, DA-4 for unity gain. Push the Audio PB level control, CUE for unity gain. Push the Audio L MONITOR SELECT key, any one of DA-1 through DA-4. (5) Push the Audio R MONITOR SELECT key, any one of DA-1 through DA-4. (6)
TC & CHR: [F1] (SOURSE) → INT [F10] (SUPER) → ON	[SET UP] [401 TCG SOURSE SELECT INT] [409 SUPER IMPOSE DISPLAY ON]
SET UP/HOME: [F11] (REC INH) → ALL → OFF	[SET UP] [027 RECORD INHIBIT ALL] REC INH Switch → OFF (7)
SET UP/VIDEO IN: [F1] (IN CF) → FIX	[SET UP] [217 INPUT CF DETECT MODE FIX]
SET UP/VIDEO OUT: [F1] (OUT REF) INPUT [F4] (OUT REF CF) → FIX [F8] (VIDEO 3) NON → COMP	[SET UP] [210 VIDEO OUT REFERENCEINPUT] [213 OUTPUT CF DETECT MODEFIX] [214 VIDEO-3 OUTPUT SELECT NONCOMP]
SET UP/AUDIO IN: [F1] (DA-1) → ANALOG [F2] (DA-2) → ANALOG [F3] (DA-3) → ANALOG [F4] (DA-4) → ANALOG [F5] (CUE) → LINE [F] + [F1] Selects the audio input signals to be recorded on the digital audio channels (DA-1 through DA-4).	[SET UP] [306 DA-1 INPUT SELECT ANALOG] [307 DA-2 INPUT SELECT ANALOG] [308 DA-3 INPUT SELECT ANALOG] [309 DA-4 INPUT SELECT ANALOG] [310 CUE INPUT SELECT LINE] [SET UP] [305 DA ALL INPUT SELECT ANALOG] Selects the audio input signals to be recorded on the digital audio channels (DA-1 through DA-4).
TEST	[ENTRY] + [center] + Search dial

SECTION 8
POWER SUPPLY ALIGNMENT

8-1. ALIGNMENT PREPARATION

[Alignment Sequence]

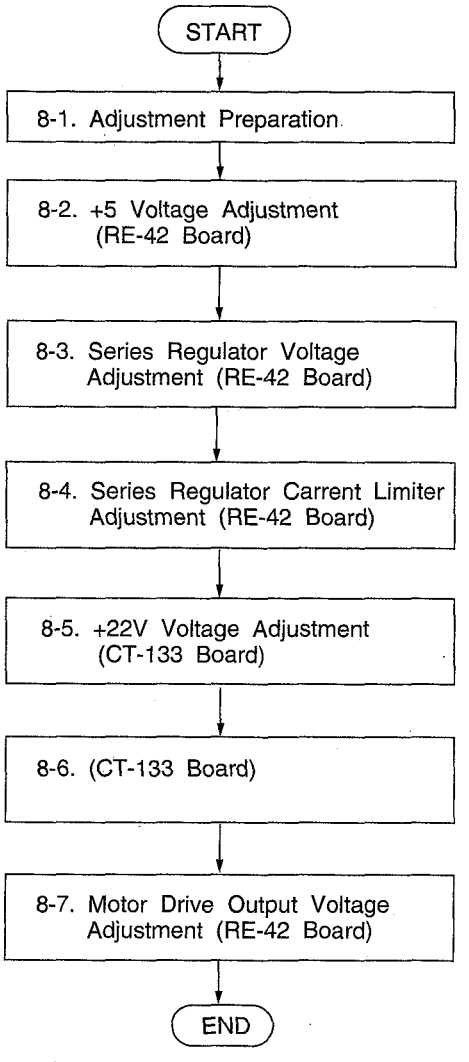
- Read Section 2-5 "Notes on Power Unit" before proceeding to inspect and adjust the power supply area.
- Avoid the alignment of the supply voltage unless it is clear that such alignment is necessary.
- When the following variable resistors have to be replaced, first set them to the following positions before attempting alignment.

CT-133 Board
RV1 .....Clockwise fully
RV2 .....Mechanical center

RE-42 Board
RV1 .....Mechanical center
RV2 .....Clockwise fully
RV3 .....Mechanical center
RV4 .....Clockwise fully
RV5 .....Mechanical center
RV6 .....Clockwise fully
RV7 .....Clockwise fully
RV9 .....Mechanical center
RV10 .....Mechanical center

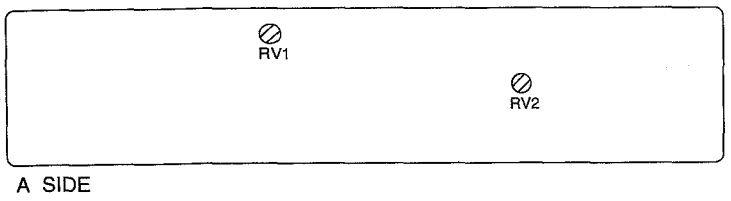
[Equipments Required]

- Digital Voltmeter (Equivalent Product: 3435/Hewlett Packard)
- Oscilloscope (Equivalent Product: 2445 or 2465/Tektronix)
- DC Current Meter (Range: 10 A)
- Extension Board: EX-185 (Supplyed Accessary)

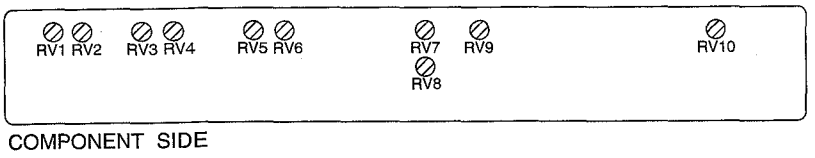


[Location]

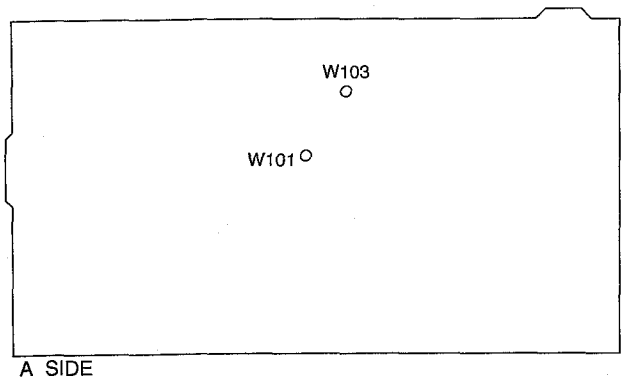
CT-133 Board



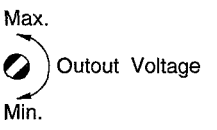
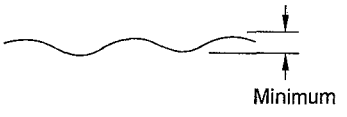
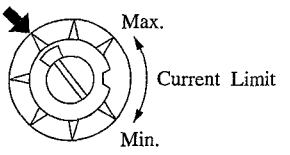
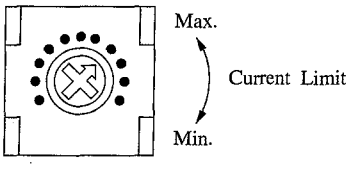
RE-42 Board



PS-255 Board



8-2. +5 V VOLTAGE ALIGNMENT (RE-42 Board)

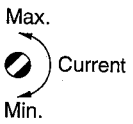
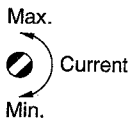
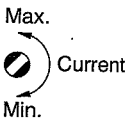
Conditions for alignment	Specifications	Adjustments
STEP1. VTR:STOP • Switch the power on. • Digital voltmeter	CN721 pin-1/MB-349 (A1) +5.00±0.02 Vdc	◓RV7/RE-42 (F1) 
STEP2. • Adjust the ripple to minimum while observing the oscilloscope. • Oscilloscope 50 mV/DIV TIME: 5 mS/DIV	CN721 pin-1/MB-349 (A1)  	◓RV8/RE-42 (F1)
Note: Adjust ◓RV9/RE-42 (E1) as follows only when it has been replaced. Otherwise, ◓RV9 shoud not be touched. • Perform the alignment in STEP 3 and 4 if it is possible to obtain the following maximum load resistor. Perform STEP 5 if it cannot be obtained. (Resistance: 0.2 to 0.25 ohm Rated power: 150 W min.)		
STEP3. • Switch the power off and disconnect CN721. • Set ◓ RV9/RE-42 (E1) to its mechanical center point. • Connect the maximum load resistor between W101 and W103 on PS-255. • Switch the power on and check on the oscilloscope that a voltage of approximately +5 V is output to W103.	• Turn ◓ RV9/RE-42 (E1) gradually clockwise and stop at the point where W103 output drops sharply.	◓RV9/RE-42 (E1)
STEP4. • Switch the power off and connect CN721.		
STEP5.	(S/N 10001 through 10099) • Adjust ◓RV9/RE-42 (E1) to the position indicated in the figure below. (3 scale units from maximum clockwise position)  (S/N 10101 and higer) • Adjust ◓RV9/RE-42 (E1) to the position indicated in the figure below. (4 scale units from maximum clockwise position)  	◓RV9/RE-42(E1)

8-3. SERIES REGULATOR VOLTAGE ALIGNMENT (RE-42 Board)

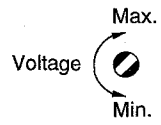
Conditions for alignment	spcifications	Adjustments
VTR:STOP	CN721 pin-15/MB-349 (A1) +12.00±0.05 Vdc	◐ RV1/RE-42 (L1)
	CN721 pin-12/MB-349 (A1) –12.00±0.05 Vdc	◐ RV3/RE-42 (J1)
	CN721 pin-9/MB-349 (A1) –5.00±0.05 Vdc	◐ RV5/RE-42 (H1)
		Max. ◐ Voltage Min.
• Digital voltmeter		

8-4. SERIES REGULATOR CURRENT LIMITER ALIGNMENT (RE-42 Board)

Note: Adjust ◓RV2, 4 and 6 (RE-42 board) as follows only when they have been replaced. Otherwise, ◓RV2, 4 and 6 should not be touched.

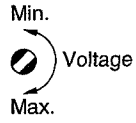
Conditions for alignment	Specifications	Adjustments
STEP1. • Switch the power off and disconnect the following board: AD-73 board (DVR-20 only) EN-99 board DE-36/37 board PR-157/163 board DIF-10 board (Optional board) REC-11 board VM-05 board (DVR-20 only) EQ-29 board, AE-15 board, DT-16 board, SV-133 board, SP-15 board, SY-165 board } *		
STEP2. • Replace EX-185 extension board into any of the above (marked with *) six circuit boards and switch on the power.		
STEP3. VTR:STOP • Connect the ⊕ terminal on the DC current meter to the +12 V TP terminal on EX-185 extension board and the ⊖ terminal to the GND TP terminal.	Current Value = 3.6±0.1A	◓RV2/RE-42 (K1) (+12 V Current limiter adjustment) 
STEP4. • Connect the ⊕ terminal on the DC current meter to the GND TP terminal on EX-185 extension board and the ⊖ terminal to the –12 V TP terminal.	Current Value = 2.5±0.1A	◓RV4/RE-42 (J1) (–12 V Current limiter adjustment) 
STEP5. • Connect the ⊕ terminal on the DC current meter to the GND TP terminal on EX-185 extension board and the ⊖ terminal to the –5 V TP terminal.	Current Value = 4.8±0.1A	◓RV6/RE-42 (H1) (–5 V Current limiter adjustment) 
STEP6. • Switch the power off, Remove EX-185 extension board and replace the boards which were disconnected in Step 1.		

8-5. +22 V VOLTAGE ALIGNMENT (CT-133 Board)

Conditions for alignment	Specifications	Adjustments
STEP1. • Switch the power off and disconnect the connector CN721 from the MB-349 board.		
STEP2. VTR:STOP • Switch the power on. • Digital voltmeter	CN105 pin-1A/PS-255 (A5) +22.5±0.1 Vdc	⊘RV2/CT-133 (A2) 
STEP3. • Switch the power off and re-connect the connector CN721 which was disconnected in Step 1.		

8-6. VOLTAGE SELECTOR PROTECTION THRESHOLD ALIGNMENT (CT-133 Board)

Note: Adjust ⊘RV1/CT-133 (B1) or D8/CT-133 (B1) as follows only when it have been replaced. Otherwise, ⊘RV1 should not be touched.

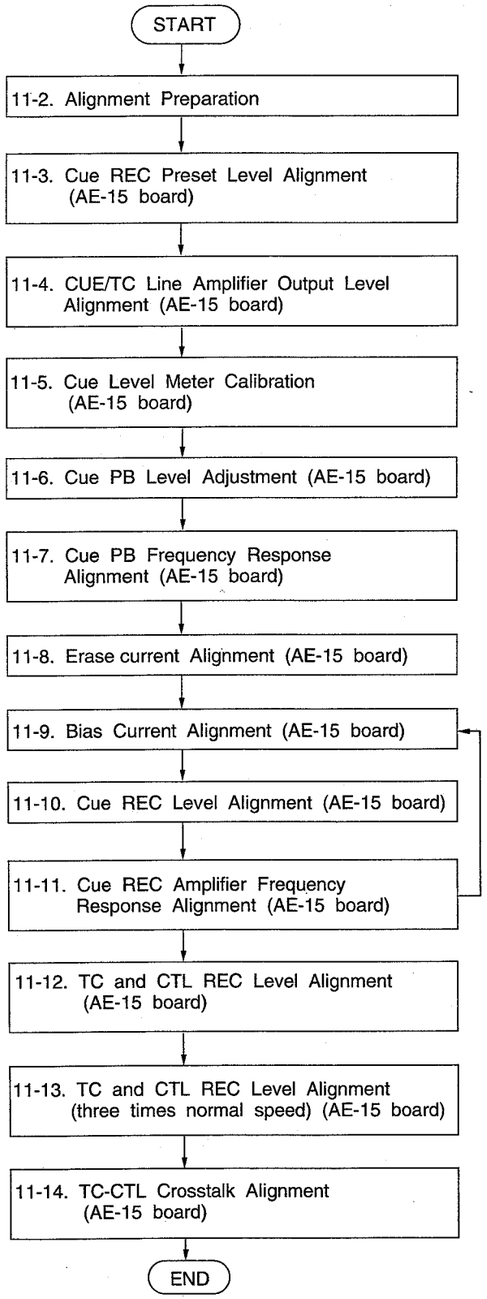
Conditions for alignment	Specifications	Adjustments
VTR:STOP • Digital voltmeter	TP3/CT-133 (B1) 4.80±0.01 Vdc	⊘RV1/CT-133 (B1) 

8-7. MOTOR DRIVE OUTPUT VOLTAGE ALIGNMENT (RE-42 Board)

Conditions for alignment	Specifications	Adjustments
VTR:STOP • Digital voltmeter	CN105 pin-5A/PS-255 (A5) +15.0±0.1 Vdc	⊘RV10/RE-42 (B1)

SECTION 11
CUE, TC, CTL SIGNAL SYSTEM ALIGNMENT

11-1. ALIGNMENT SEQUENCE (AE-15 BOARD)

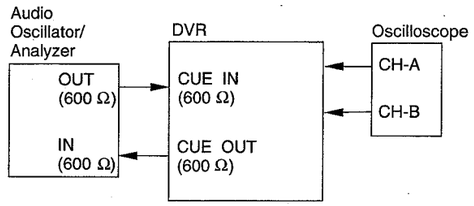


11-2. ALIGNMENT PREPARATION

[Equipment Required]

- Oscilloscope (Equivalent product: 2445 or 2465/Tektronix)
- Audio oscillator/analyzer (Equivalent product: TM5006/Tektronix)
- Alignment Tape; ER5-2NTSC
- Extention board; EX-185

[Connection]



[Control panel setting]

TC& CHR :	(SOURCE) → INT
AUDIO OUT :	(CUE) → UNITY
AUDIO IN :	(CUE) → UNITY
SET UP/AUDIO IN :	(LINE)

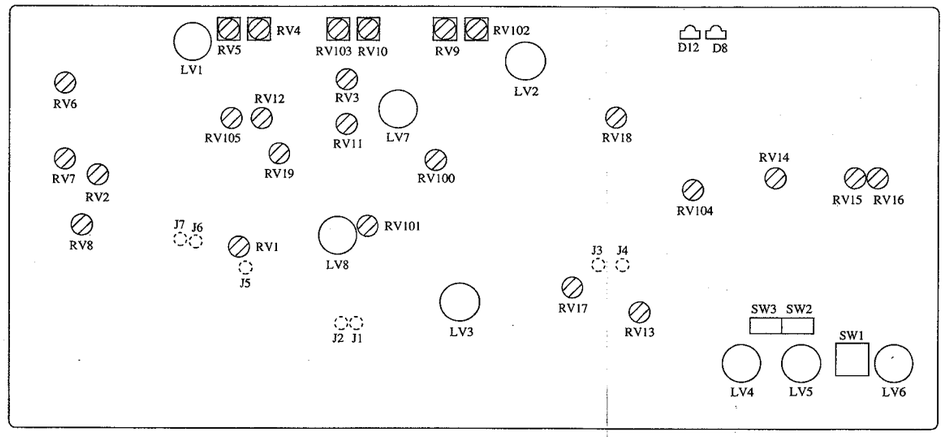
[Switch/Jumper setting]

AE-15 Board

J1: CUE LINE.....SHORT
J2: .....OPEN
J3: CUE LINE.....SHORT
J4: TC LINE .....SHORT
J5: CUE LINE.....SHORT
J6: .....SHORT
J7: .....OPEN

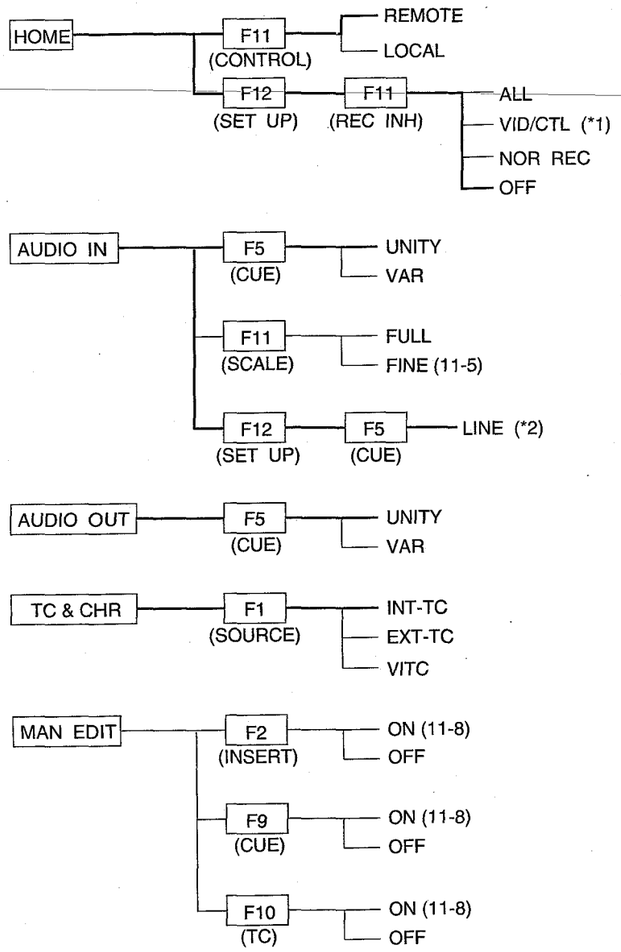
[Location]

AE-15 Board



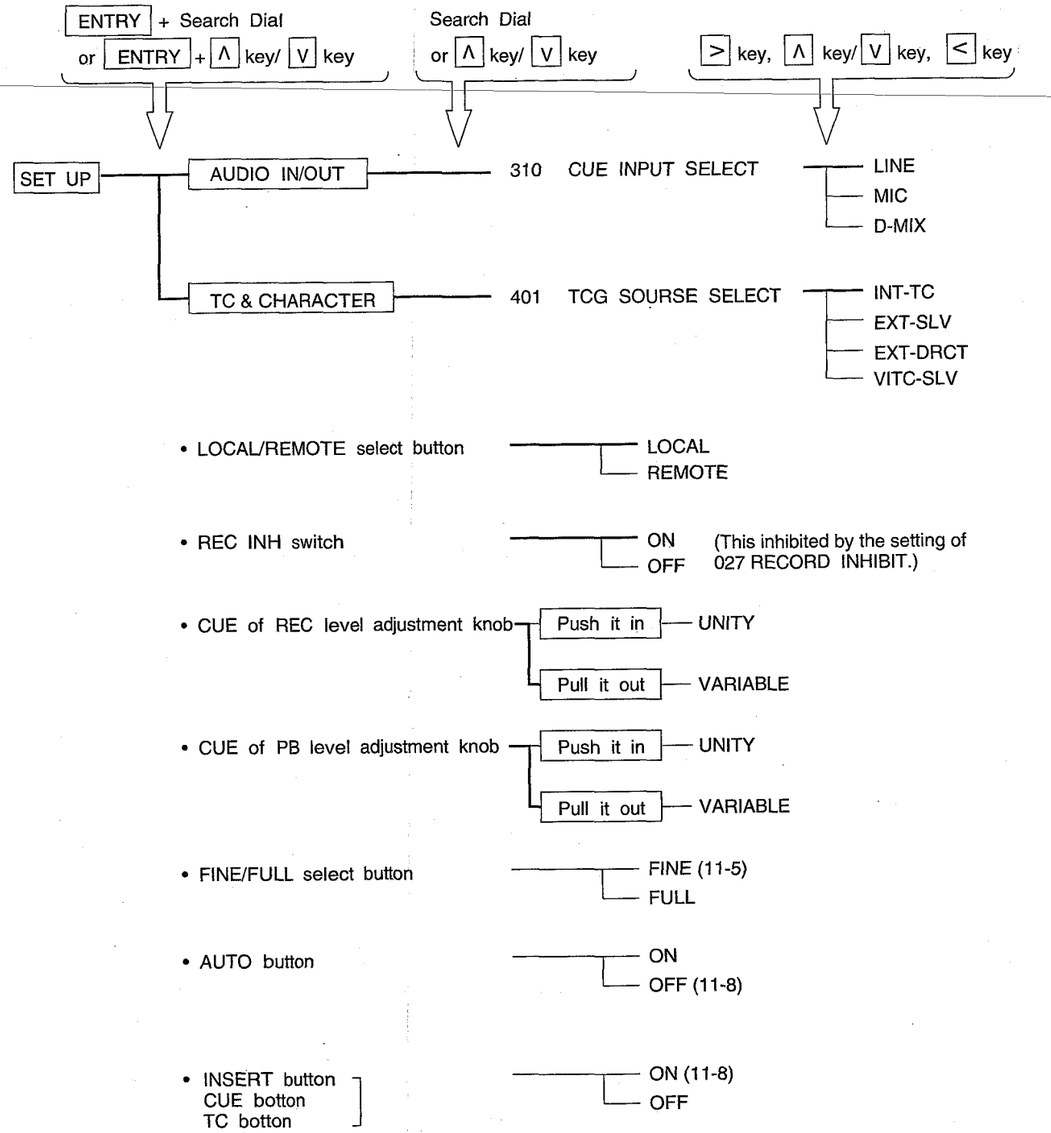
A SIDE
(J1~J2 : B SIDE)

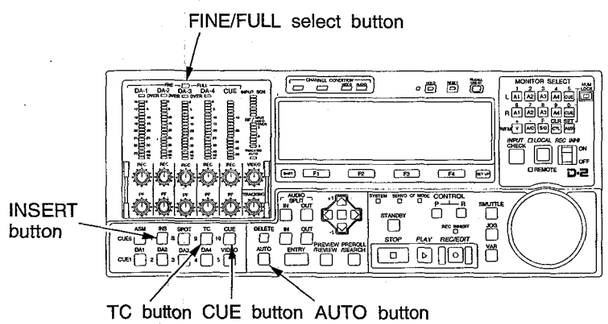
BKDV-101



*1. This cab be set by the USER HOLE of the cassette.
*2. Excluding DVR-C20/C20P.

BKDV-201/200





11-3. CUE REC PRESET LEVEL ALIGNMENT (AE-15 Board)

Conditions for alignment	Specifications	Adjustments
• Connection: Same as Sec. 11-2. • VTR: STOP (EE) • Input signal (CUE IN): 1 kHz/+8 dBm • Switch/Jumper setting: Same as Sec. 11-2. • Control panel setting: Same as Sec. 11-2. • Audio oscillator/analyzer	TP25/AE-15 (J3) – 0.44 Vdc TP26/AE-15 (C2) – 0.44 Vdc TP1/AE-15 (A3) +3.0±0.1 dB TP4/AE-15 (G4) – 6.0±01 dB	⊘RV104/AE-15 (J3) (CUE input VCA control level alignment) ⊘RV105/AE-15 (C2) (CUE PB VCA control level alignment) ⊘RV1/AE-15 (D3) ⊘RV2/AE-15 (B3)

11-4. CUE/TC LINE AMPLIFIER OUTPUT LEVEL ALIGNMENT (AE-15 Board)

Conditions for alignment	Specifications	Adjustments
STEP 1. • Connection: Same as Sec. 11-2. • VTR: STOP (EE) • Input signal (CUE IN): 1 kHz/+8 dBm • Switch/Jumper setting: Same as Sec. 11-2. • Control panel setting: Same as Sec. 11-2. • Audio oscillator/analyzer	CUE OUT +8.0±0.1 dBm	⊘RV17/AE-15 (G4)
STEP 2. • VTR: REC	TIME CODE OUT +1.20±0.01 Vrms (600 ohms load)	⊘RV13/AE-15 (H4)

11-5. CUE LEVEL METER CALIBRATION (AE-15 Board)

Conditions for alignment	Specifications	Adjustments
• Connection: Same as Sec. 11-2. • VTR: STOP (EE) • Input signal (CUE IN): 1 kHz/+8 dBm • Switch/Jumper setting: Same as Sec. 11-2. • Control panel setting: AUDIO IN; (SCALE) = FINE Other settings are the same as Sec. 11-2. • Audio oscillator/analyzer	CUE level meter – 20±0 dB	⊘RV8/AE-15 (A3)

11-6. CUE PB LEVEL ALIGNMENT (AE-15 Board)

Conditions for alignment	Specifications	Adjustments
• Connection: Same as Sec. 11-2. • VTR: PB • Switch/Jumper setting: Same as Sec. 11-2. • Control panel setting: Same as Sec. 11-2. • Play back the 1 kHz/0 VU portion of the ER5-2 alignment tape. • Audio oscillator/analyzer	CUE OUT +8.0±0.1 dB	⊘RV7/AE-15 (A2)

11-7. CUE PB FREQUENCY RESPONSE ALIGNMENT (AE-15 Board)

Conditions for alignment	Specifications	Adjustments
STEP 1. • Connection: Same as Sec. 11-2. • VTR: PB • Switch/Jumper setting: Same as Sec. 11-2. • Control panel setting: Same as Sec. 11-2. • Play back the 1 kHz/0 VU portion of the ER5-2 alignment tape. • Audio oscillator/analyzer	CUE OUT −2.0±0.1 dBm	⊘Level Control/Function Control Panel
STEP 2. • Play back the 10 kHz/−10 UV portion of the ER5-2 alignment tape.	CUE OUT −2.0±0.1 dBm	⊘RV6/AE-15 (A1)
STEP 3. • After the adjustment is completed, perfom Section 11-6. CUE PB Level Adjustment.		

11-8. ERASE CURRENT ALIGNMENT (AE-15 Board)

11-8-1. Erase Current Resonance Alignment

Make the following alignments, shown in the table below, in each mode of CUE INSERT, TC INSERT, and CTL REC.

Conditions for alignment	Specifications	Adjustments
• Connection: Same as Sec. 11-2. • VTR: INSERT (CUE) • Switch/Jumper setting: Same as Sec. 11-2. • Control panel setting: (INSERT) = ON (CUE) = ON Other settings are the same as Sec. 11-2. • Oscilloscope 50 mV/DIV 200 mS/DIV	TP14/AE-15 (J5) Maximum level	⊘LV4/AE-15 (K4) (CUE channel erase current response alignment)
• VTR: INSERT (TC) • Control panel setting: (INSERT) = ON (TC) = ON Other settings are the same as Sec. 11-2. • Oscilloscope 50 mV/DIV 200 mS/DIV	TP16/AE-15 (K5) Maximum level	⊘LV5/AE-15 (C1) (TC channel erase current response alignment)
• VTR: REC (CTL) • Press [REC] button and then set VTR to REC mode. • Oscilloscope 50 mV/DIV 200 mS/DIV	TP18/AE-15 (L5) Maximum level	⊘LV6/AE-15 (A1) (CTL channel erase current response alignment)

11-8-2. Erase Current Level Alignment

Make the following alignments, shown in the table below, in each mode of CUE INSERT, TC INSERT, and CTL REC.

Conditions for alignment	Specifications	Adjustments
• Connection: Same as Sec. 11-2. • VTR: INSERT (CUE) • Switch/Jumper setting: Same as Sec. 11-2. • Control panel setting: (INSERT) = ON (CUE) = ON Other settings are the same as Sec. 11-2. • Oscillator 50 mV/DIV 200 mS/DIV	TP14/AE-15 (J5) 210±10 mVp-p	⊘RV14/AE-15 (K2) (CUE channel erase current response adjustment)
VTR: INSERT (TC) • Control panel setting: (INSERT) = ON (CUE) = ON Other settings are the same as Sec. 11-2. • Oscilloscope 50 mV/DIV 200 mS/DIV	TP16/AE-15 (K5) 160±10 mVp-p	⊘RV15/AE-15 (L2) (TC channel erase current response adjustment)
VTR: REC (CTL) • Press [REC] button and then set VTR to REC mode. • Oscilloscope 50 mV/DIV 200 mS/DIV	TP18/AE-15 (L5) 550^{+0}_{-40} mVp-p	⊘RV16/AE-15 (L2) (CTL channel erase current response adjustment)

11-9. BIAS CURRENT ALIGNMENT (AE-15 Board)

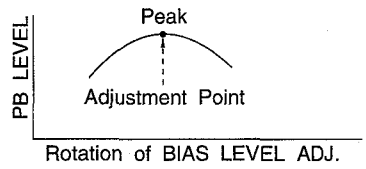
11-9-1. Bias Current Resonance Alignment

Conditions for alignment	Specifications	Adjustments
• Connection: Same as Sec. 11-2. • VTR: REC • Switch/Jumper setting: Same as Sec. 11-2. • Control panel setting: Same as Sec. 11-2. • Oscilloscope 20 mV/DIV 2 mS/DIV	CUE; TP3/AE-15 (B2) Maximum level TC; TP8/AE-15 (F4) Maximum level CTL; TP21/AE-15 (G2) Maximum level	⊘LV1/AE-15 (C1) (CUE REC Bias current resonance adjustment) ⊘LV3/AE-15 (F4) (TC REC Bias current resonance adjustment ②) ⊘LV8/AE-15 (E3) (TC REC Bias current resonance adjustment ①) ⊘LV2/AE-15 (G1) (CTL REC Bias current resonance adjustment ②) ⊘LV7/AE-15 (F2) (CTL REC Bias current resonance adjustment ①)

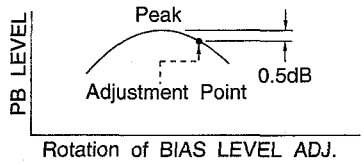
11-9-2. Bias Current Level Alignment

Conditions for alignment	Specifications	Adjustments
• Connection: Same as Sec. 11-2. • VTR: REC • Switch/Jumper setting: Same as Sec. 11-2. • Control panel setting: Same as Sec. 11-2. • Oscilloscope 500 mV/DIV 2 mS/DIV	CTL; TP21/AE-15 (G2) 60±5 mVp-p	⊘RV100/AE-15 (F2)

11-9-3. TC Bias Level Alignment

Conditions for alignment	Specifications	Adjustments
• Connection: Same as Sec. 11-2. • VTR: REC → PB • Switch/Jumper setting: Same as Sec. 11-2. • Control panel setting: Same as Sec. 11-2. • Oscillator: 500 mV/DIV 2 mS/DIV	TP9/AE-15 (G1)  • Repeat self recording and playing back while adjusting ⊘RV101 until TC PB level is at a peak.	⊘RV101/AE-15 (E3) 1. Turn the TC Bias Level control ⊘RV101/AE-15 (E3) counter-clockwise fully. 2. Put VTR into REC mode. 3. Turn this control clockwise gradually. 4. Play back the recorded portion and search for the peak point of TC PB level.

11-9-4. Bias Current Resonance Alignment

Conditions for alignment	Specifications	Adjustments
• Connection: Same as Sec. 11-2. • VTR: REC → PB • Input signal (CUE IN): 6.3 kHz/–2 dBm • Switch/Jumper setting: Same as Sec. 11-2. • Control panel setting: Same as Sec. 11-2. • Oscillator: 100 mV/DIV 2 mS/DIV	TP4/AE-15 (G4)  • Repeat self recording and playing back while adjusting ⊘RV3 until CUE PB level is –0.5dB of a peak over.	⊘RV3/AE-15 (E1) 1. Turn the CUE Bias Level control ⊘RV3/AE-15 (E1) counter-clockwise fully. 2. Put VTR into REC mode. 3. Turn this control clockwise gradually. 4. Play back the recorded portion and search for the peak point of CUE PB level. 5. Adjust ⊘RV3 that CUE PB level is –0.5dB of a peak over.

11-10. CUE REC LEVEL ALIGNMENT (AE-15 Board)

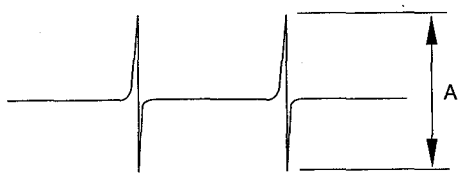
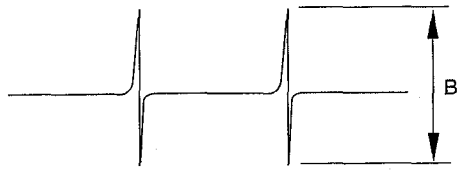
Conditions for alignment	Specifications	Adjustments
STEP 1. • Connection: Same as Sec. 11-2. • VTR: STOP • Input signal (CUE IN): 1 kHz/–8 dBm • Switch/Jumper setting: Same as Sec. 11-2. • Control panel setting: Same as Sec. 11-2. • Audio oscillator/analyzer	CUE OUT +8.0±0.1 dBm	(Check) If the specification is not met, perform Section 11-4. CUE/TC Line Amplifier Output Level Alignment.
STEP 2. • Play back 1 kHz/0 VU portion of ER5-2 alignment tape.	CUE OUT +8.0±0.1 dBm	If the specification is not met, perform Section 11-6. CUE PB Level Alignment.
STEP 3. • Using a commercially available cassette tape, perform self recording and playing back 1 kHz/+8 dBm signal. Play back the recorded portion.	CUE OUT +8.0±0.1 dBm	If the specification is not met, turn ◐RV4/AE-15 (D1) slightly and repeat the procedure of STEP 3.

11-11. CUE REC AMPLIFIER FREQUENCY RESPONSE ALIGNMENT (AE-15 Board)

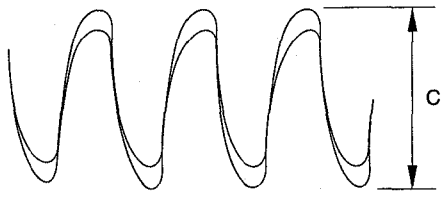
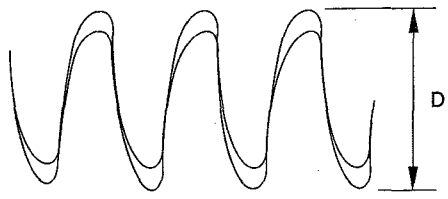
Conditions for alignment	Specifications	Adjustments
STEP 1. • Connection: Same as Sec. 11-2. • VTR: STOP • Input signal (CUE IN): 1 kHz/+8 dBm • Switch/Jumper setting: Same as Sec. 11-2. • Control panel setting: Same as Sec. 11-2. • Perform STEP 1 of Section 11-10 CUE REC Level Alignment. • Audio oscillator/analyzer		(Check)
STEP 2. • VTR: REC → PB • Input signal (CUE IN): 1 kHz/–2 dBm 10 kHz/–2 dBm • Using commercially available cassette tape, record 1 kHz/– 2 dBm signal and 10 kHz/– 2 dBm signal on CUE channel respectively. Play back the recorded portion.	CUE OUT 10 kHz level = 1 kHz level ±0.5 dBm (1 kHz: Reference)	If the level is not met specifications, turn ◐RV5/AE-10 (C1) slightly and repeat the procedure of STEP 2.
STEP 3. • After alignment is completed, perform STEPs 2 and 3 of Section 11-8 CUE REC Level Alignment.		

11-12. TC AND CTL REC LEVEL ALIGNMENT (AE-15 Board)

11-12-1. REC CTL Level Alignment

Conditions for alignment	Specifications	Adjustments
STEP 1. • Connection: Same as Sec. 11-2. • VTR: PB • Switch/Jumper setting: Same as Sec. 11-2. • Control panel setting: Same as Sec. 11-2. • Play back ER5-2 alignment tape. • Oscilloscope 500 mV/DIV 2 mS/DIV	TP19/AE-15 (H1)  A=1.8±0.2 Vp-p • Check the PB CTL level.	⊘RV18/AE-15 (H2) (PB CTL level check) • If the specification is not met, turn ⊘ RV9/AE-15 (F1) slightly and repeat the procedure of STEP 1.
STEP 2. • VTR: REC → PB • Using commercially available tape, perform self recording and playback.	TP19/AE-15 (H1)  B=A±0.1 Vp-p	⊘RV9/AE-15 (F1) (REC CTL level alignment) • If the specification is not met, turn ⊘ RV9/AE-15 (F1) slightly and repeat the procedure of STEP 2.

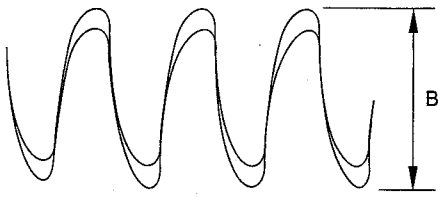
11-12-2. REC TC Level Alignment

Conditions for alignment	Specifications	Adjustments
STEP 1. • Connection: Same as Sec. 11-2. • VTR: PB • Switch/Jumper setting: Same as Sec. 11-2. • Control panel setting: Same as Sec. 11-2. • Play back ER5-2 alignment tape. • Oscilloscope 500 mV/DIV 2 mS/DIV	TP9/AE-15 (G1)  C=1.8 $^{+0.8}_{-0.6}$ Vp-p • Check the PB TC level.	(PB CTL level check)
STEP 2. • VTR: REC → PB • Using commercially available tape, perform self recording and playback.	TP9/AE-15 (G1)  D=C±0.1 Vp-p	⊘RV10/AE-15 (E1) (REC CTL level alignment) • If the specification is not met, turn⊘RV10/AE-15 (E1) slightly and repeat the procedure of STEP 2.

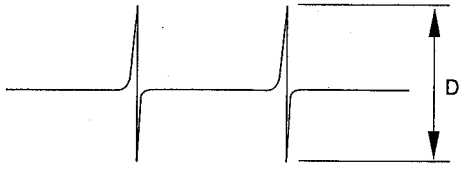
11-13. TC AND CTL REC LEVEL ALIGNMENT (three times normal speed) (AE-15 Board)

Perform Section 11-12 TC and CTL REC Level Alignment befor this adjustment.

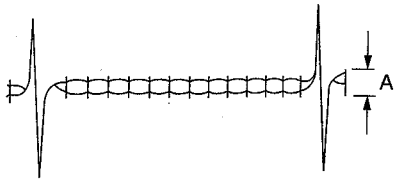
11-13-1. REC TC Level Alignment (three times normal speed)

Conditions for alignment	Specifications	Adjustments
• Connection: Same as Sec. 11-2. • VTR: FORMAT→PB • Switch/Jumper setting: Same as Sec. 11-2. • Control panel setting: Same as Sec. 11-2. • Using commercially available cassette tape, perform three times normal speed recording and playing back. • Oscilloscope 500 mV/DIV 2 mS/DIV	TP9/AE-15 (G1)  B=A±0.1 Vp-p (A = the value of Section 11-12-1, STEP 1)	⊘RV103/AE-15 (E1) • If the specification is not met, turn ⊘RV103/AE-15 (E1) slightly and repeated the procedure.

11-13-2. REC CTL Level Alignment (three times normal speed)

Conditions for alignment	Specifications	Adjustments
• Connection: Same as Sec. 11-2. • VTR: FORMAT→PB • Switch/Jumper setting: Same as Sec. 11-2. • Control panel setting: Same as Sec. 11-2. • Using commercially available cassette tape, perform three times normal speed recording and playing back. • Oscilloscope 500 mV/DIV 2 mS/DIV	TP19/AE-15 (H1)  D=C±0.1 Vp-p (C = the value of Section 11-12-2, STEP 1)	⊘RV102/AE-15 (F1) • If the specification is not met, turn ⊘RV102/AE-15 (F1) slightly and repeat the procedure.

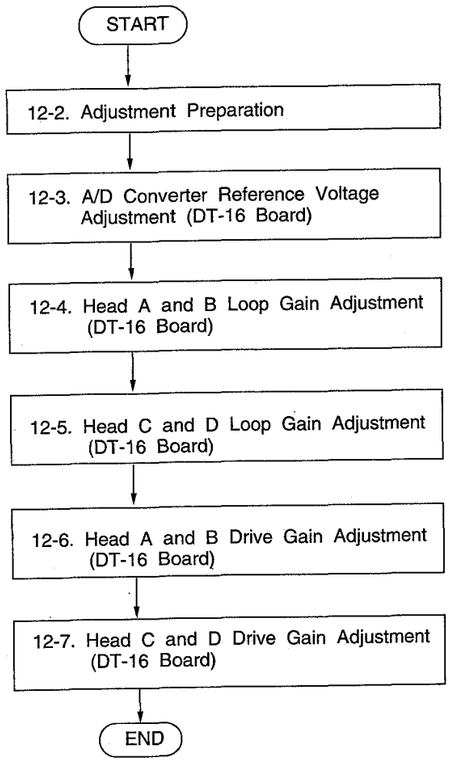
11-14. TC-CTL CROSSTALK ALIGNMENT (AE-15 Board)

Conditions for adjustment	Specifications	Adjustments
• Connection: Same as Sec. 11-2. • VTR: REC → TC INSERT • Switch/Jumper setting: Same as Sec. 11-2. • Control panel setting: Same as Sec. 11-2. • Using commercially available cassette tape and put VTR into REC mode. • Put VTR into TC INSERT mode while playing back the recorded portion. • Oscilloscope 500 mV/DIV 2 mS/DIV	CTL; TP19/AE-15 (H1)  A≦0.3 Vp-p or less • Adjust ⊘RV11, ⊘RV12 and ⊘RV19 so that the crosstalk becomes minimum.	⊘RV11/AE-15 (E2) (TC-CTL Closstalk canceler frequency response alignment) ⊘RV12/AE-15 (D2) (TC-CTL Closstalk canceler level alignment) ⊘RV19/AE-15 (D2) (TC-CTL Closstalk canceler high frequency gain alignment)

SECTION 12
DT SYSTEM ALIGNMENT

12-1. ALIGNMENT SEQUENCE

• Befor adjusting the DT system, adjust the tape pass system, PG phase, CTL phase, RF signal system and the video signal system.

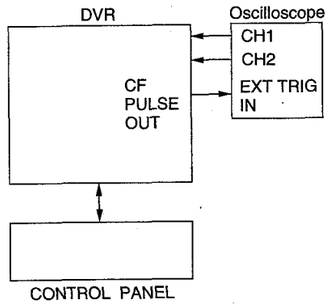


12-2. ALIGNMENT PREPARATION

[Equipment Required]

- Degital voltmeter
  (Equivalent product: 3435A/Hewlett Packard)
- Oscilloscope
  (Equivalent product: 2445 or 2465/Tektronix)
- Adjustment tape (Self recording):
  Refer to Preparation of adjustment tape (Self recording).

[Connection]



[Control Panel Setting]

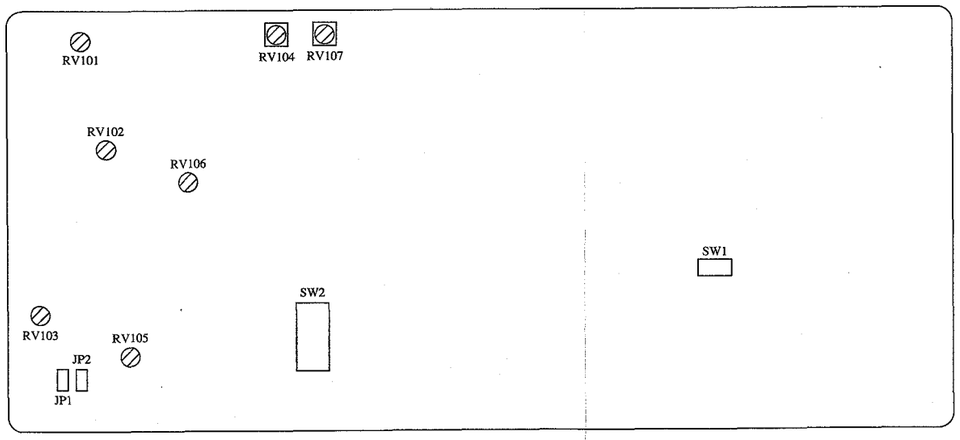
	(CONTROL) → LOCAL
	(PRE READ) → OFF
VIDEO IN:	(VIDEO) → INT SG
VIDEO OUT:	(CF PULSE) → OUT FRM
	(REC INH) → OFF
AUDIO IN:	(DA1) → INT SG
	(DA2) → INT SG
	(DA3) → INT SG
	(DA4) → INT SG

[Switch/Jumper initial setting]

SW1-1, 2 .....ON
SW2-1, 2, 3, 4, 5, 6, 7, 8 .....OFF
JP1/2.....SHORT

[Location]

DT-16 Board



COMPONENT SIDE (A SIDE)

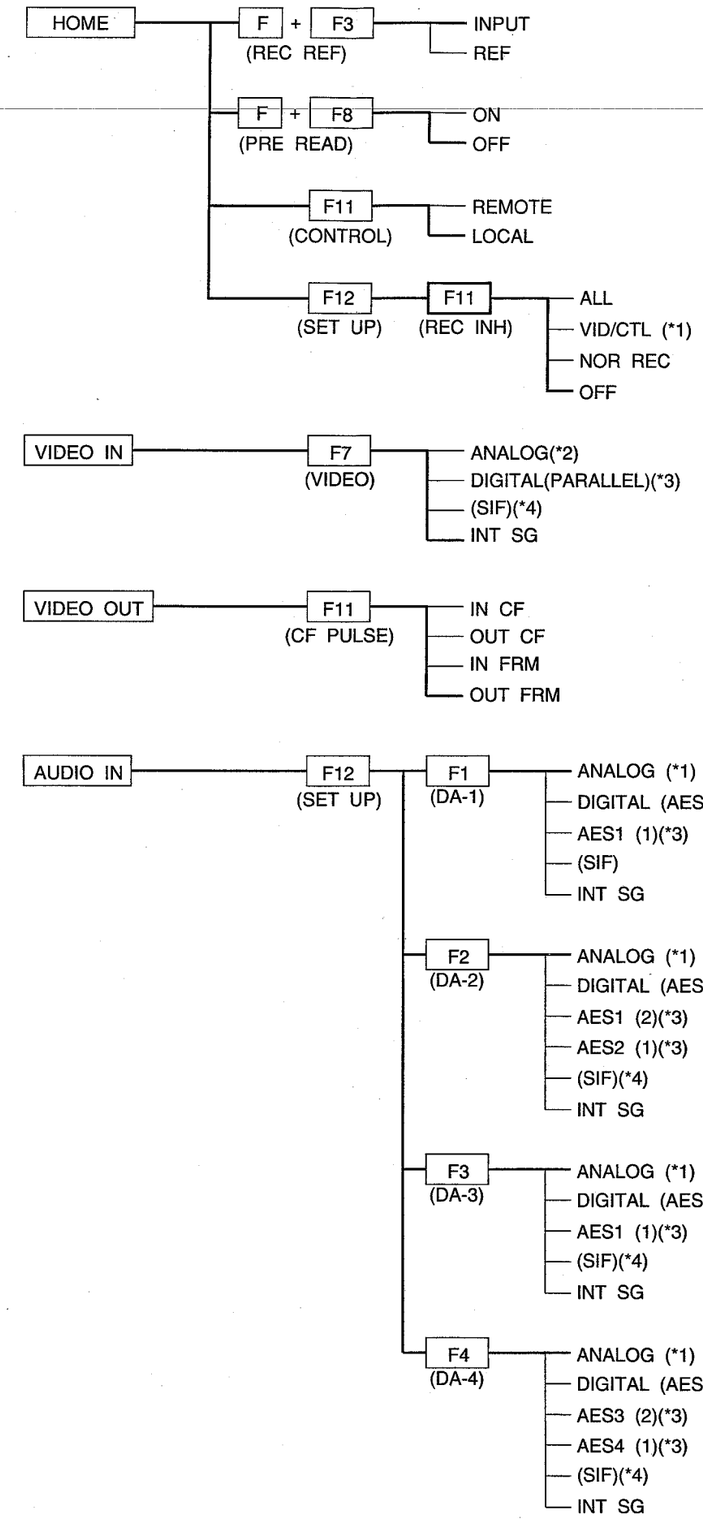
[Preparation of alignment tape (self recording)]

(1) Set the following adjustments to their respective mechanical centers.

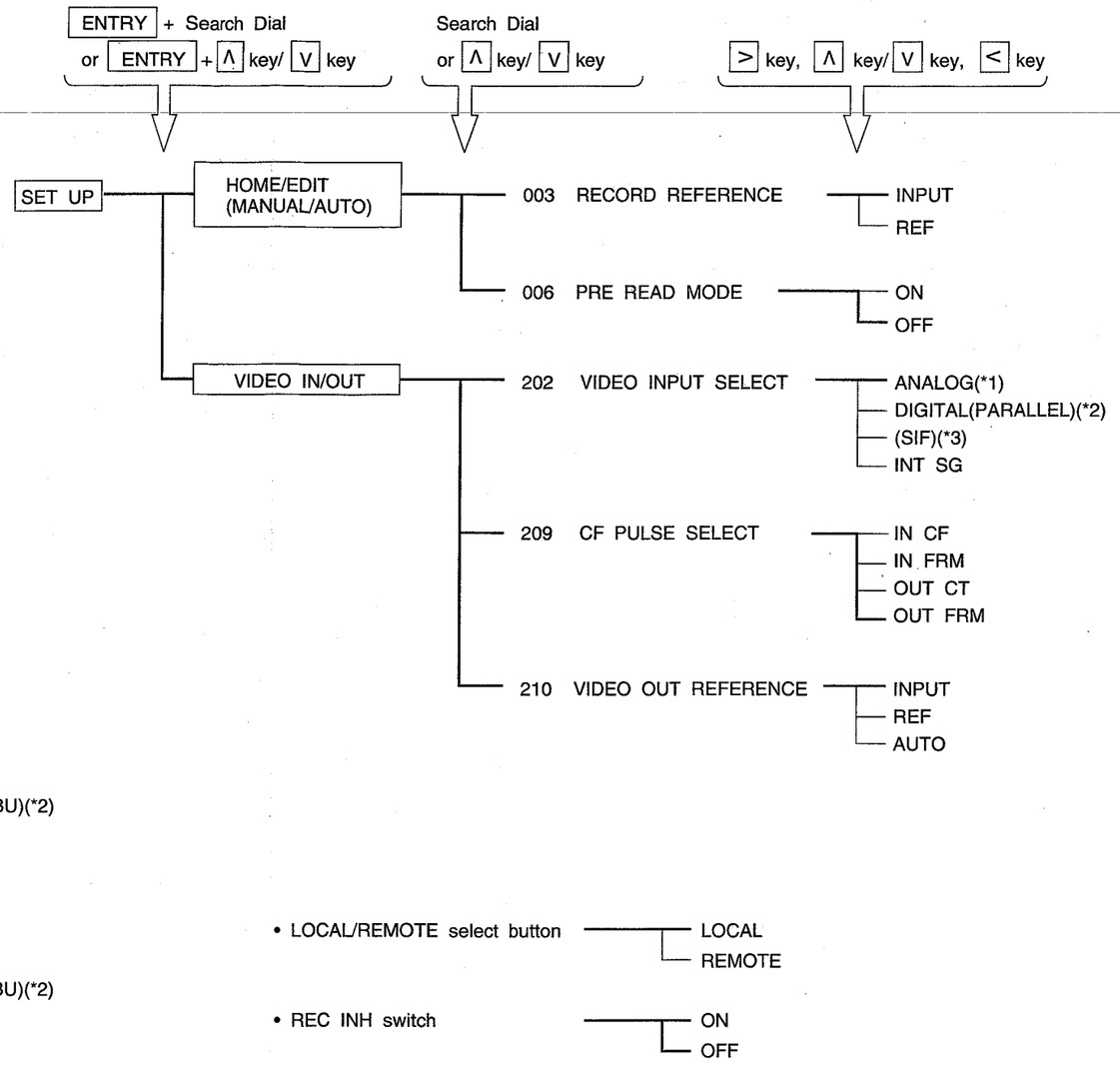
DT-16 board:
●RV102 (B1), RV103 (D1) AND RV105 (D2).

(2) Input color bars. Perform self-recording for about 3 minutes using a commercially available cassette tape.

BKDV-101



BKDV-201/200



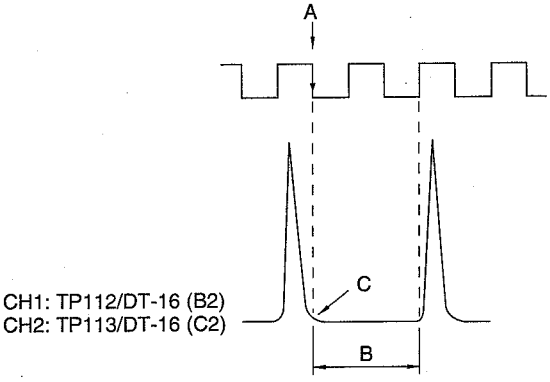
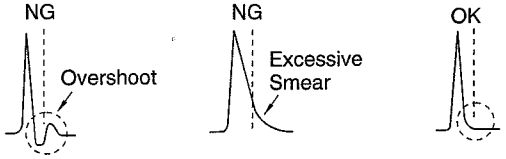
*1. This can be set by the USER HOLE of the cassette.
*2. In the DVR-C20, ANALOG mode cannot be selected.
*3. The figures in parentheses are displayed when BKDV-105/106/205/206 are mounted.
*4. The content in parentheses can be selected only when BKDV-105/106/205/206 are mounted.

BKDV-105 : Corresponding to DVR-28
BKDV-106 : Corresponding to DVR-28
BKDV-205 : Corresponding to DVR-20/C20
BKDV-206 : Corresponding to DVR-20P/C20P

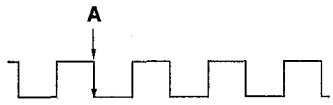
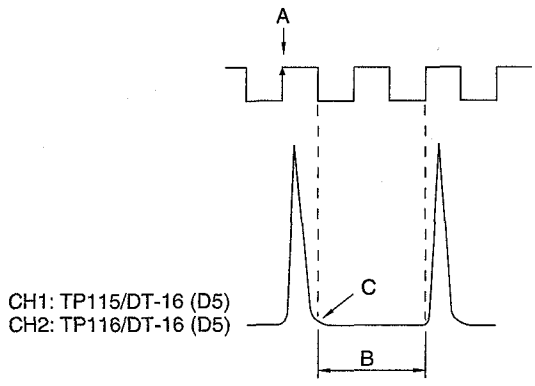
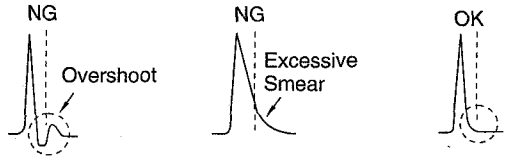
12-3. A/D CONVERTER REFERENCE VOLTAGE ALIGNMENT (DT-16 Board)

Conditions for alignment	Specifications	Adjustments
• Connection: Same as Sec. 12-2. • VTR: STOP • Switch/Jumper setting: Same as Sec. 12-2. • Control panel setting: Same as Sec. 12-2. • Digital Voltmeter	TP105/DT-16 (A1) +5.00±0.01 Vdc	◐ RV101/DT-16 (A1)

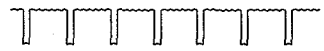
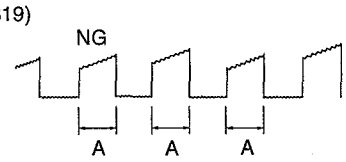
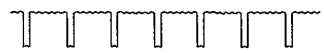
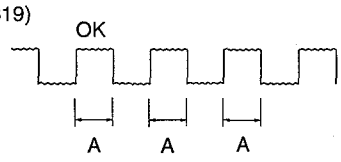
12-4. HEAD A AND B LOOP GAIN ALIGNMENT (DT-16 Board)

Conditions for alignment	Specifications	Adjustments
STEP 1. • Connection: Same as Sec. 12-2. • VTR: VAR (x–1.0) • Switch/Jumper setting: SW1-1/2 (C16): OFF Other settings are the same as Sec. 12-2. • Control panel setting: Same as Sec. 12-2. • Play back the adjustment tape in the VAR mode at –1.0 times normal speed. • Oscilloscope 2V/DIV TIME: 5mS/DIV TRIG: EXT(–)	CN407 Pin-9C/DT-16 (E14) • Adjust the horizontal position control knob of the oscilloscope so that the rising edge of the waveform (part A) coincides with the second scale division from left on the screen.	Oscilloscope; Horizontal position control knob
STEP 2. • Oscilloscope CH1: 0.2 V/DIV CH2: 0.2 V/DIV **INVERT** TIME: 5 mS/DIV MODE: ADD TRIG: EXT (–)	CN407 Pin-9C/DT-16 (E14)  CH1: TP112/DT-16 (B2) CH2: TP113/DT-16 (C2) • Adjust the VAR GAIN control knob of CH-1 on the oscilloscope until the waveform at part B becomes horizontal.	Oscilloscope; VAR GAIN control knob of CH1
	 • Adjust ◐ RV103/DT-16 (D1) so that the waveform at part C has no overshoot and excessive smear and also the waveform at part B is horizontal. • Repeat STEP 2 several times.	◐ RV103/DT-16 (D1)
STEP 3. • Switch SW1-1 and SW1-2/DT-16 (C16) on.		

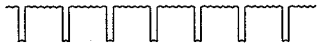
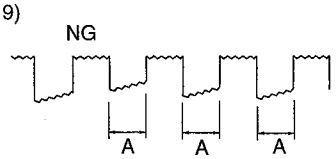
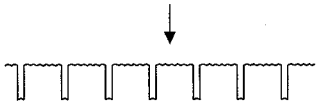
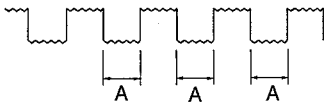
12-5. HEAD C AND D LOOP GAIN ALIGNMENT (DT-16 Board)

Conditions for alignment	Specifications	Adjustments
STEP 1. • Connection: Same as Sec. 12-2. • VTR: VAR (×–1.0) • Switch/Jumper setting: SW1-1/2 (C16): OFF Other settings are the same as Sec. 12-2. • Control panel setting: Same as Sec. 12-2. • Play back the adjustment tape in the VAR mode at –1.0 times normal speed. • Oscilloscope 2V/DIV TIME: 5mS/DIV TRIG: EXT (–)	CN407 Pin-9C/DT-16 (E14)  • Adjust the horizontal position control knob of the oscilloscope so that the rising edge of the waveform (part A) coincides with the second scale division from left on the screen.	Oscilloscope; Horizontal position control knob
STEP 2. • Oscilloscope CH1: 0.2 V/DIV CH2: 0.2 V/DIV **INVERT** TIME: 5 mS/DIV MODE: ADD TRIG: EXT (–)	CN407 Pin-9C/DT-16 (E14)  • Adjust the VAR GAIN control knob of CH-1 on the oscilloscope until the waveform at part B becomes horizontal.	Oscilloscope; VAR GAIN control knob of CH1
	 • Adjust ◐RV105/DT-16 (D2) so that the waveform at part C has no overshoot and excessive smear and also the waveform at part B is horizontal. • Repeat STEP 2 several times.	◐RV103/DT-16 (D1)
STEP 3. • Switch SW1-1 and SW1-2/DT-16 (C16) on.		

12-6. HEAD A AND B DRIVE GAIN ALIGNMENT (DT-16 Board)

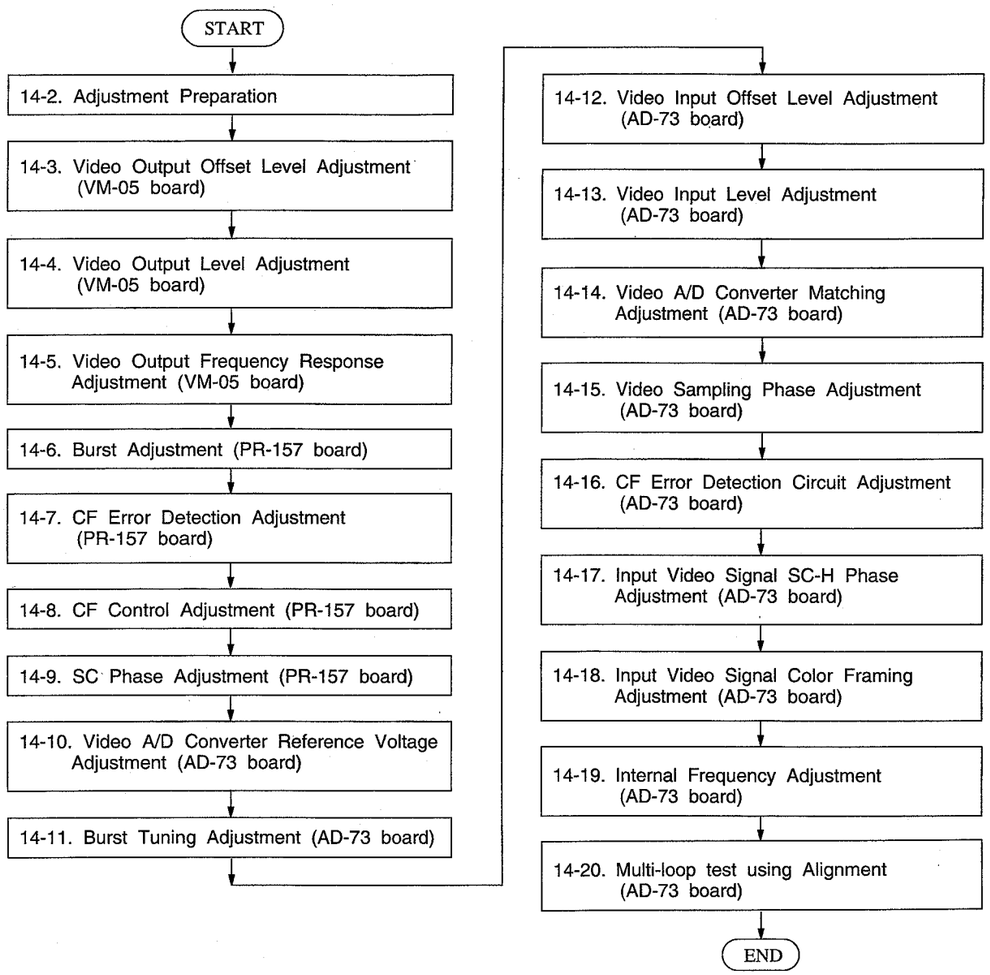
Conditions for alignment	Specifications	Adjustments
STEP 1. • Connection: Same as Sec. 12-2. • VTR: PB • Switch/Jumper setting: SW1-1/2 (C16): OFF Other settings are the same as Sec. 12-2. • Control panel setting: Same as Sec. 12-2. • Play back the adjustment tape in the STILL mode. • Oscilloscope CH1: 0.5 V/DIV CH2: 0.5 V/DIV TIME: 5 mS/DIV TRIG: EXT (–)	CH1: TP102/DT-16 (A5)  CH2: TP109/DT-16 (B19)  CH1: TP102/DT-16 (A5)  CH2: TP109/DT-16 (B19)  • Pre-adjust ⊘ RV102/DT-16 (B1) so that the waveform at part A becomes uniformly horizontal.	⊘ RV102/DT-16 (B1)
STEP 2. VTR: VAR (×-1, ×+3) • Play back the adjustment tape in the VAR mode at both -1 times and +3 times normal speed.	• Adjust finely ⊘ RV102/DT-16 (B1) so that the waveform at part A becomes uniformly horizontal and the RF envelope becomes minimize in the VAR mode at both –1 times and +3 times normal speed.	
STEP 3. • Switch SW1-1 and SW1-2/DT-16 (C16) on.		

12-7. HEAD C AND D DRIVE GAIN ALIGNMENT (DT-16 Board)

Conditions for alignment	Specifications	Adjustments
STEP1. • Connection: Same as Sec. 12-2. • VTR: PB • Switch/Jumper setting: SW1-1/2 (C16): OFF Other settings are the same as Sec. 12-2. • Control panel setting: Same as Sec. 14-2. • Play back the adjustment tape in the STILL mode. • Oscilloscope CH1: 0.5 V/DIV CH2: 0.5 V/DIV TIME: 5 mS/DIV TRIG: EXT (–)	CH1: TP102/DT-16 (A5)  CH2: TP109/DT-16 (B19) NG  CH1: TP102/DT-16 (A5)  CH2: TP109/DT-16 (B19) OK  • Pre-adjust ⊘RV106/DT-16 (B5) so that the waveform at part A becomes uniformly horizontal.	⊘ RV106/DT-16 (B5)
STEP 2. VAR: VAR (×-1, ×+3) • Play back the adjustment tape at both -1 times and +3 times normal speed.	• Adjust finely ⊘RV102/DT-16 (B1) so that the waveform at part A becomes uniformly horizontal and the RF envelope becomes minimize in the VAR mode at both –1 times and +3 times normal speed.	
STEP 3. • Switch SW1-1 and SW1-2/DT-16		

SECTION 14
VIDEO SIGNAL SYSTEM ALIGNMENT

14-1. ALIGNMENT SEQUENCE



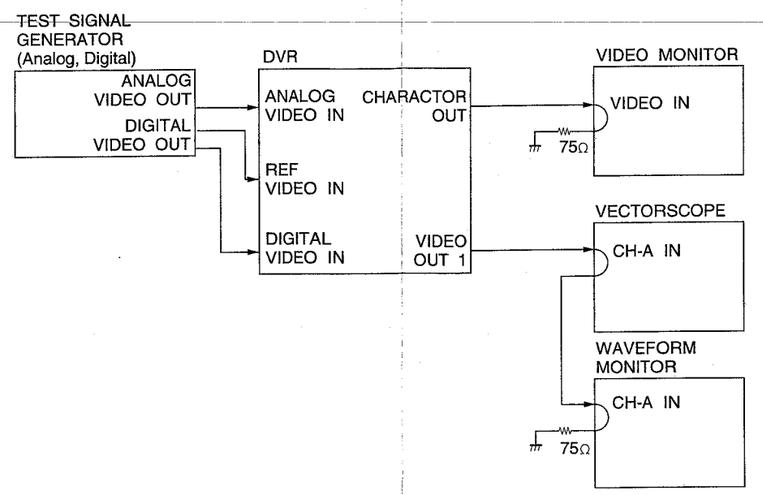
14-2. ALIGNMENT PREPARATION

[Eqipment Required]

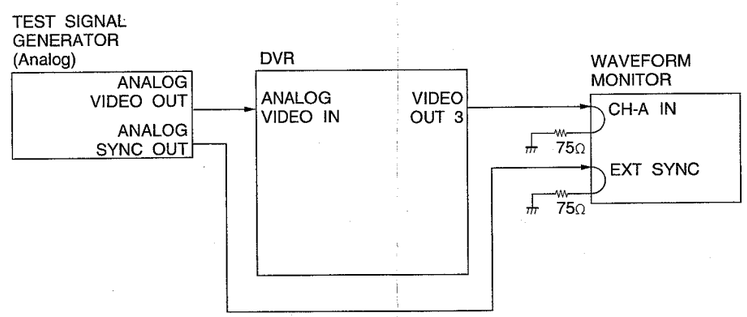
- Oscilloscope (Equivalent Product: 2445 or 2465/Tektronix)
- Vectorscope (Equivalent Product: 1750/Tektronix)
- Waveform Monitor (Equivalent Product: 1485R/Tektronix)
- Video Picture Monitor
- Test Signal Generator (Equivalent Product: 1410 or TSG-170D/Tektronix)
- Alignment tape (ER5-2 NTSC)

[Connection]

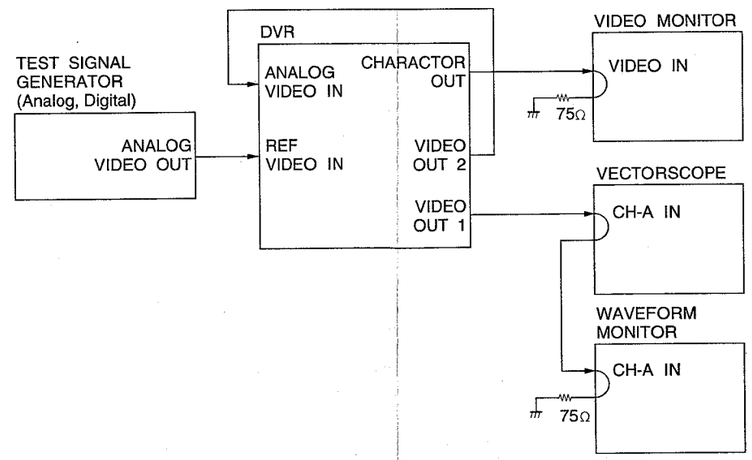
Connection 1.

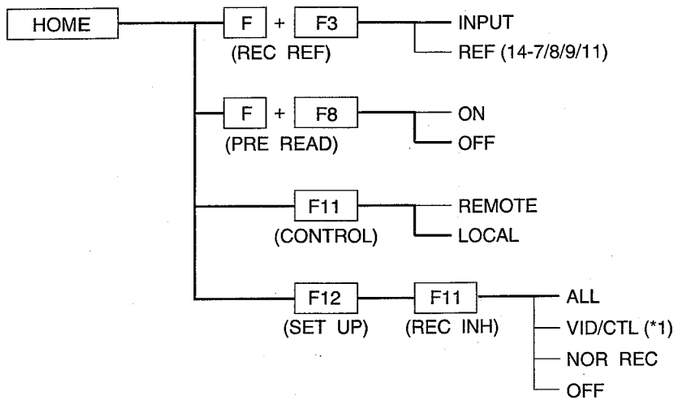


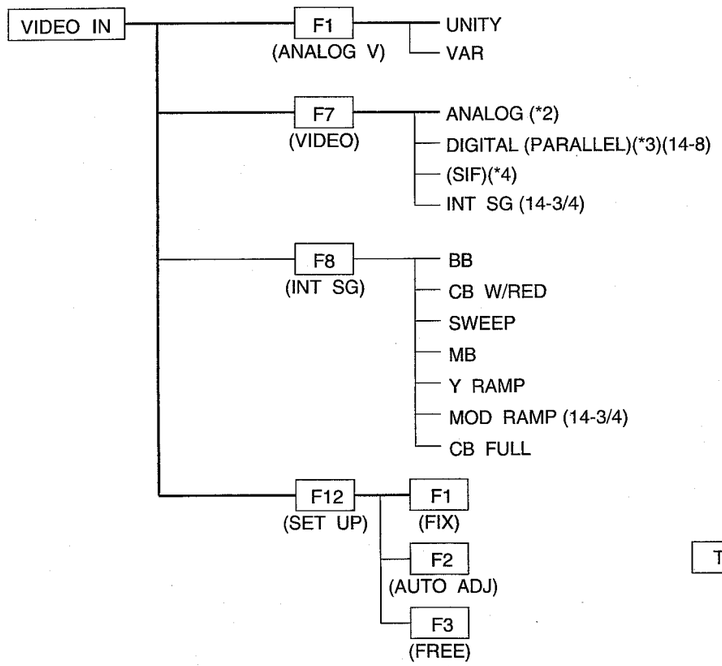
Connection 2.

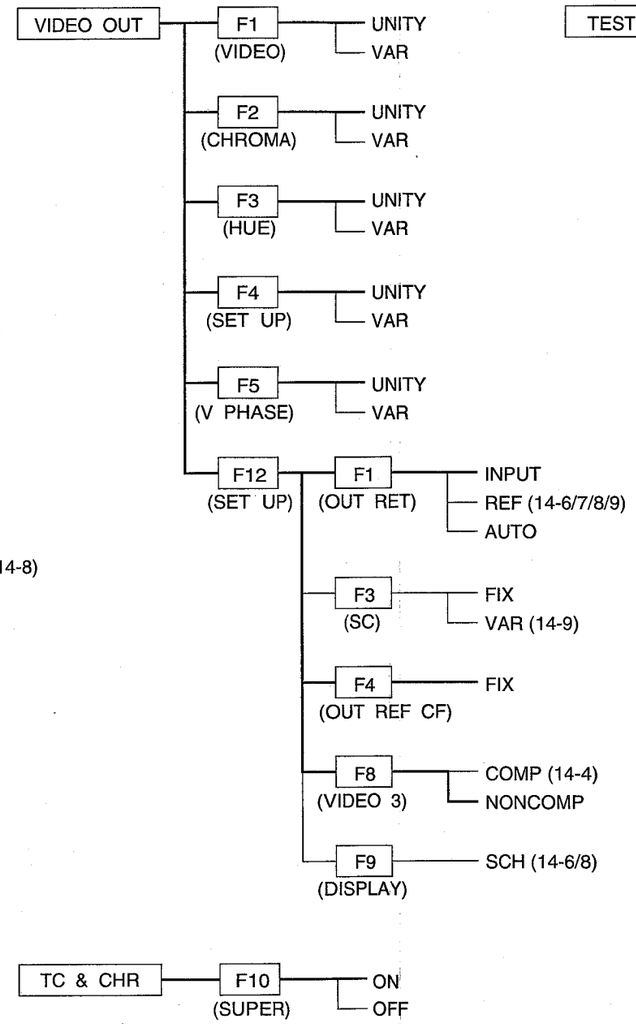


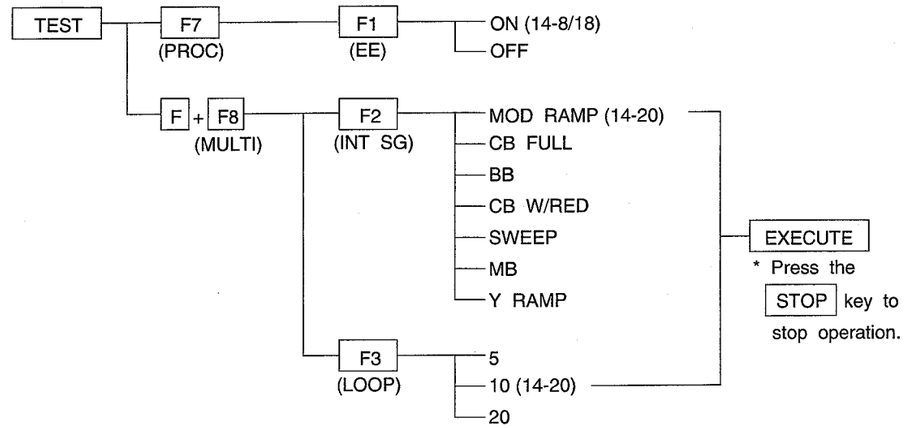
Connection 3.











*1 This can be set by the USER HOLE of the cassette.
*2. In the DVR-C20, ANALOG mode cannot be selected.
*3. The figures in parentheses are displayed when BKDV-105/106/205/206 are mounted.
*4. The content in parentheses can be selected only when BKDV-105/106/205/206 are mounted.

BKDV-105 : Corresponding to DVR-28
BKDV-106 : Corresponding to DVR-28
BKDV-205 : Corresponding to DVR-20/C20
BKDV-206 : Corresponding to DVR-20P/C20P

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[Control Panel Setting]

	(REC REF) = INPUT
	(PRE READ) = OFF
VIDEO IN:	(ANALOG V) = UNITY
	(VIDEO) = ANALOG
VIDEO OUT:	(VIDEO) = UNITY
	(CHROMA) = UNITY
	(HUE) = UNITY
	(SET UP) = UNITY
	(V PHASE) = UNITY
TC & CHR:	(SUPER) = ON
SET UP/VIDEO IN:	(IN CF) = FIX
SET UP/VIDEO OUT:	(OUT REF) = INPUT
	(OUT REF CF) = FIX
	(VIDEO 3) = NON COMP

[Switch/Jumper Initial Setting]

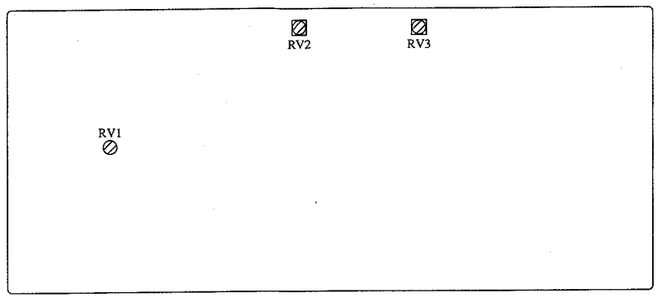
AD-73 board
JP1/2.....JP1
JP201, 301, 401, 501.....SHORT
JP202, 302, 402, 502.....OPEN
JP203, 303, 403, 503.....OPEN
JP204, 304, 404, 504.....OPEN
JP205, 305, 405, 505.....SHORT
JP206, 306, 406, 506.....OPEN
JP207, 307, 407, 507.....OPEN

EN-99 board
JW 1, 3, 5, ...SHORT
JW2 , 4, 7, X5.....OPEN
S2-1, 2, 3, 4, 5, 6, 7, 8. .....ON
S3-1, 2, 3, 4, 5, 6, 7, 8.....OFF
S3-5, 6, 8, 10.....ON
S4-1, 2, 3, 4, 5, 6, 7, 8.....ON

PR-157 board
S1.....ON
S2-1, 7, 8.....ON
S2-2, 3, 4, 5, 6, 9, 10.....OFF

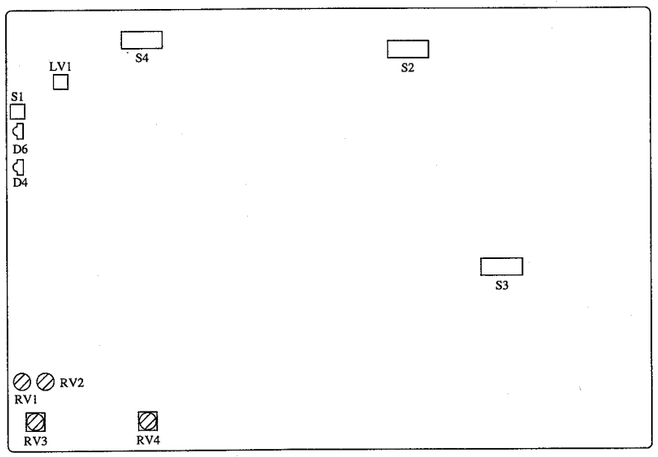
[Location]

VM-05 Board



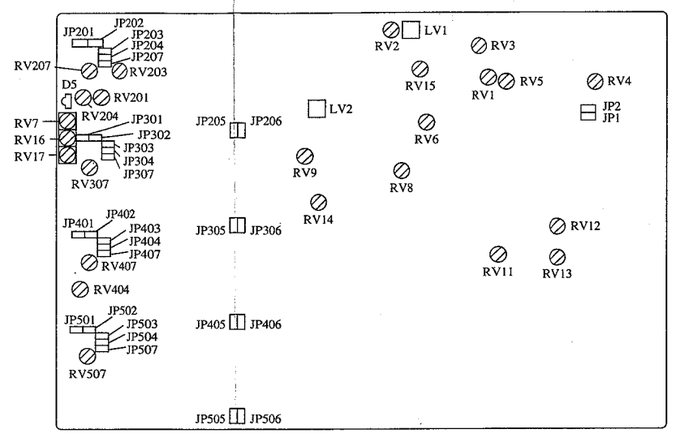
COMPONENT SIDE

PR-157 Board



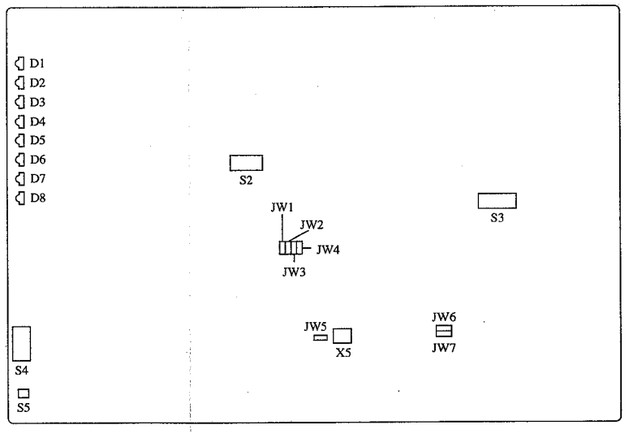
A SIDE

AD-73 Board



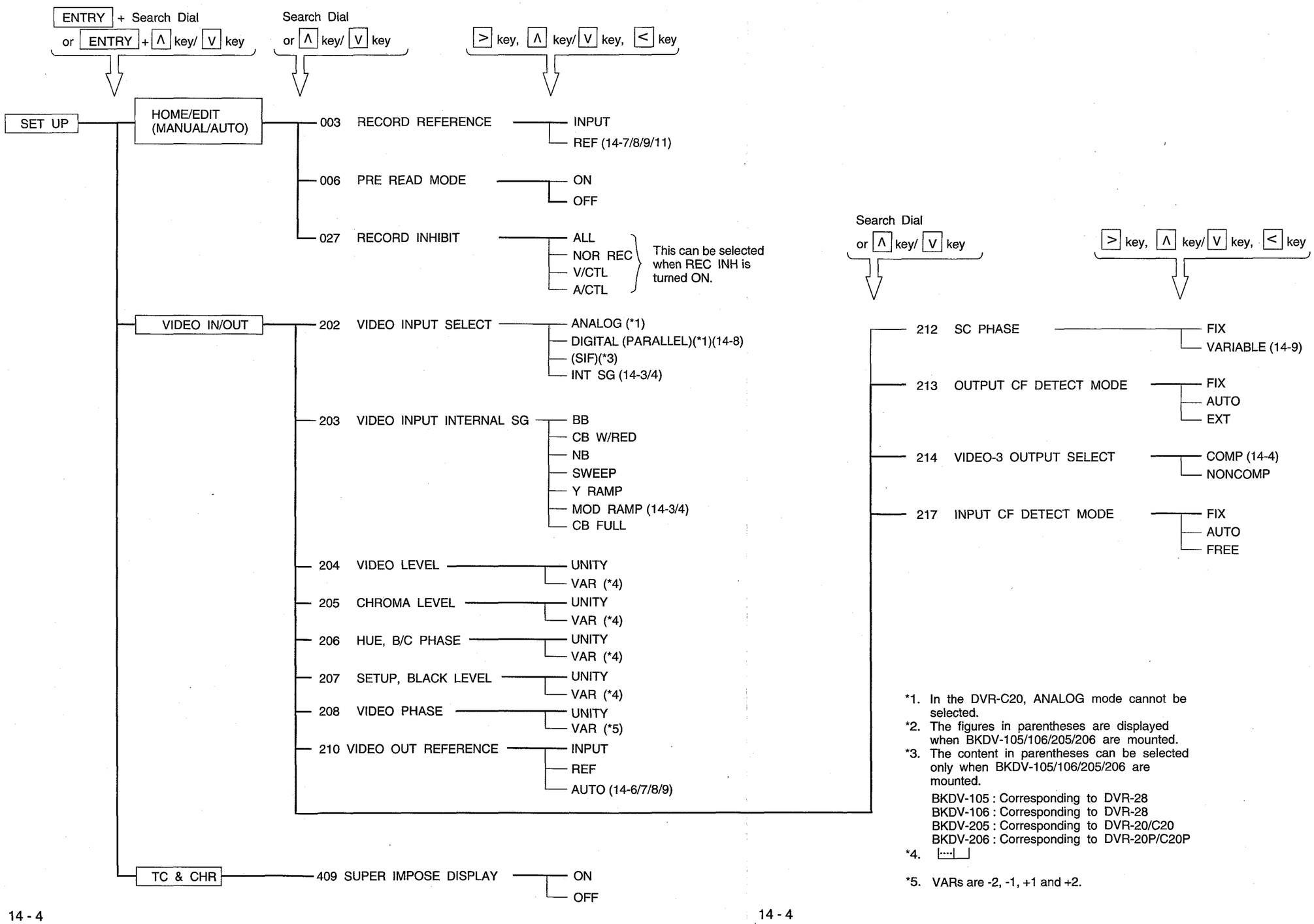
A SIDE

EN-99 Board



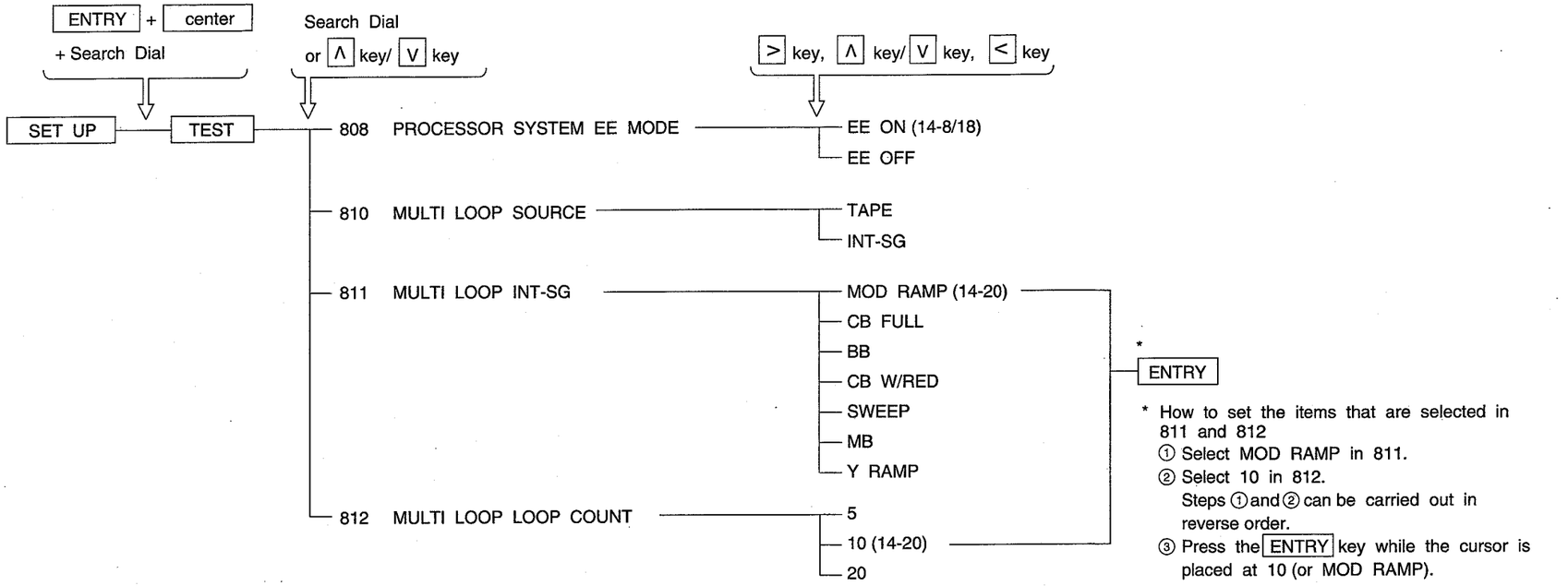
A SIDE

BKDV-201/200 (1/2)



*1. In the DVR-C20, ANALOG mode cannot be selected.
*2. The figures in parentheses are displayed when BKDV-105/106/205/206 are mounted.
*3. The content in parentheses can be selected only when BKDV-105/106/205/206 are mounted.
BKDV-105 : Corresponding to DVR-28
BKDV-106 : Corresponding to DVR-28
BKDV-205 : Corresponding to DVR-20/C20
BKDV-206 : Corresponding to DVR-20P/C20P
*4. [....]
*5. VARs are -2, -1, +1 and +2.

14 - 4



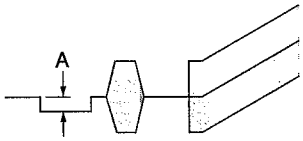
* How to set the items that are selected in 811 and 812
① Select MOD RAMP in 811.
② Select 10 in 812.
Steps ① and ② can be carried out in reverse order.
③ Press the ENTRY key while the cursor is placed at 10 (or MOD RAMP).

Note: Press the STOP Key to stop operation.

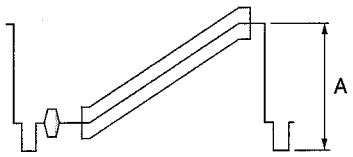
- LOCAL/REMOTE select button — LOCAL / REMOTE
- REC INH switch — ON (select "ALL" on 027, RECORD INHIBIT.) / OFF
- VIDEO level adjustment knob — Push it in — UNITY / Pull it out — VARIABLE
- VIDEO OUT , F12 (SET UP) and F9 → SCH at BKDV-101
  indicate the input SCH meter on the control panel.

14 - 6

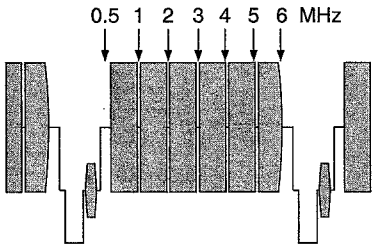
14-3. VIDEO OUTPUT OFFSET LEVEL ALIGNMENT (VM-05 board)

Conditions for alignment	Specifications	Adjustments
• Connection: 14-2. Connection 2 • VTR: STOP (EE) • Input signal (ANALOG VIDEO IN): Free • Switch/Jumper setting: Same as Sec. 14-2. • Control panel setting VIDEO IN (VIDEO) → INT SG (INT SG) → MOD RAMP Other settings are the same as Sec. 14-2. • Waveform Monitor	VIDEO OUTPUT 3  A=0.00±0.01 V	⊘ RV2/VM-05/D1

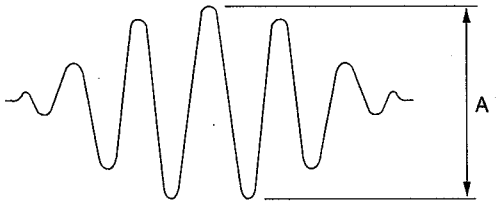
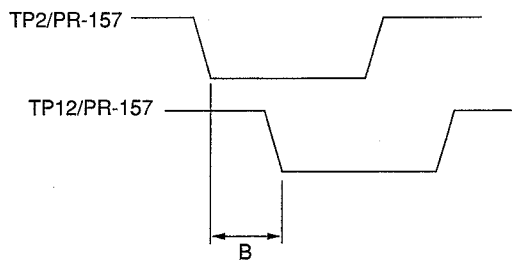
14-4. VIDEO OUTPUT LEVEL ALIGNMENT (VM-05 board)

Conditions for alignment	Specifications	Adjustments
• Connection: 14-2. Connection 2 • VTR: PLAY • Input signal (ANALOG VIDEO IN): Free • Switch/Jumper setting: Same as Sec. 14-2. • Control panel setting VIDEO IN (VIDEO) → INT SG (INT SG) → MOD RAMP Other settings are the same as Sec.14-2. • Waveform monitor	VIDEO OUTPUT 3  A=0.00±0.01 V	⊘ RV3/VM-05/F1

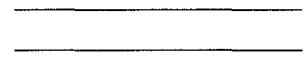
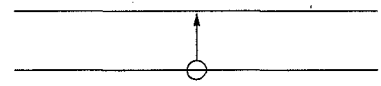
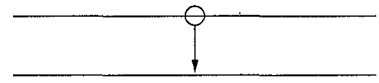
14-5. VIDEO OUTPUT FREQUENCY RESPONCE ALIGNMENT (VM-05 board)

Conditions for alignment	Specifications	Adjustments
• Connection: 14-2. Connection 1 • VTR: STOP (EE) • Input signal (ANALOG VIDEO IN): H sweep • Switch/Jumper setting: Same as Sec. 14-2. • Control panel setting: VIDEO IN (VIDEO) → INT SG (INT SG) → SWEEP Other settings are the same as Sec. 14-2. • Waveform monitor	VIDEO OUTPUT 3  0.5 to 5.5 MHz=Flat (Within ±2% based on 0.5 MHz.)	⊘ RV1/VM-05 (B3)

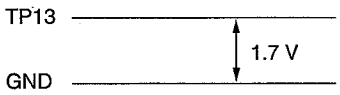
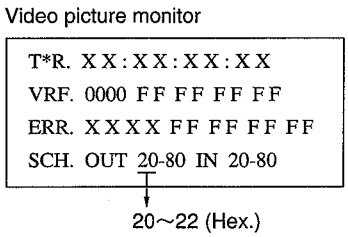
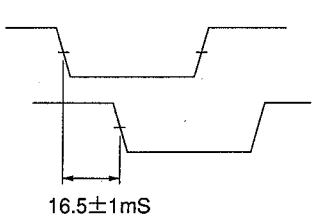
14-6. BURST ALIGNMENT (PR-157 board)

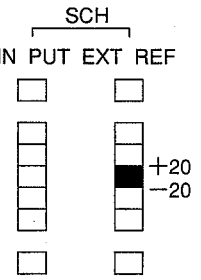
Conditions for alignment	Specifications	Adjustments
STEP 1 • Connection: 14-2. Connection 1 •VTR: STOP (EE) • Input signal (REF VIDEO IN): BLACK BURST (RS-170A) • Switch/Jumper setting: Same as Sec. 14-2. • Control panel setting: HOME: (REC REF) →REF VIDEO IN: (VIDEO) →INT SG (Free) SET UP/VIDEO OUT: (REF) →REF • More than five minutes are passed after switch the power ON, then the following alignments. • Oscilloscope 100mV/DIV 1μS/DIV TRIG (−): TP2/PR-157 (D13) MODE: 20MHz BW LIMIT	TP1/PR-157 (D-13)  • Adjust ◐LV1/PR-157 (B3) so that the burst amplitude becomes maximum.	◐LV1/PR-157 (B3)
STEP 2 Check • Oscilloscope 1V/DIV 20μS/DIV TRIG (−): TP2/PR-157 (D3)	TP2/PR-157 (D13) TP12/PR-157 (B12)  	◐LV1/PR-157 (B3) If the specification is not satisfied, perform STEP1.
STEP 3 • After this alignment, perform the following alignment. 14-19. CF Control Alignment		

14-7. CF ERROR DETECTION ALIGNMENT (PR-157 board)

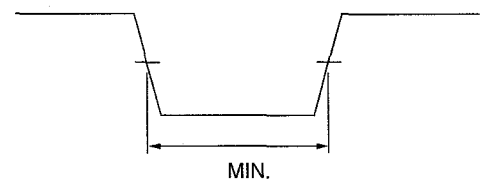
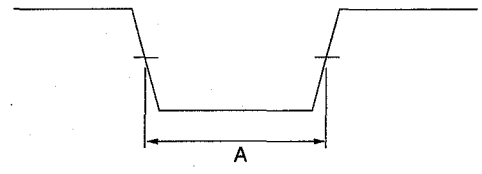
Conditions for alignment	Specifications	Adjustments
• Connection: 14-2. Connection 1 •VTR: STOP (EE) • Input signal (REF VIDEO IN): BLACK BURST (RS-170A), 75-ohm terminated. • Switch/Jumper setting: S4-8/EN-99 (A19): OFF Other settings are the same as Sec. 14-2. • Control panel setting: (VIDEO) → INT SG (Free) SET UP/VIDEO OUT: (REF) →REF TC & CHR: (SUPER) → ON Other settings are the same as Sec. 14-2.	STEP 1. TP9/PR-157 (A21)  TWO LEVELS	◐RV3/PR-157 (A21)
	STEP 2. TP11/PR-157 (A20) TP9/PR-157 (A21)  • Match the high level of TP9/PR-157 (A21) to the level of TP11/ PR-157 (A20).	◐RV2/PR-157 (A19) (Offset Alignment)
• Oscilloscope 1V/DIV 20μS/DIV	STEP 3. TP9/PR-157 (A21) TP10/PR-157 (A19)  • Match the high level of TP9/PR-157 (A21) to the level of TP10/ PR-157 (A19).	◐RV1/PR-157 (A19) (Gain Alignment) • Confirm that the high and low levels of TP9/PR-157 (A21) are same as the levels of TP10 and TP11. If they don't meet the specification, readjust from STEP1.

14-8. CF CONTROL ALIGNMENT (PR-157 board)

Conditions for alignment	Specifications	Adjustments
STEP 1. • Connection: 14-2. Connection 1 •VTR: STOP (EE) • Input signal (REF VIDEO IN): BLACK BURST (RS-170A), 75-ohm terminated. • Switch/Jumper setting: S4-8/EN-99 (A19): OFF • Control panel setting: VIDEO IN: (VIDEO) → INT SG (Free) TC &CHR: (SUPER) → ON SET UP/VIDEO OUT: (REF) →REF • Oscilloscope 500mV/DIV 5mS/DIV MODE: 20MHz BW LIMIT	TP13/PR-157 (B18) 	⊘RV3/PR-157 (A21) (CF error Pre-adjustment)
STEP 2. • Video picture monitor	While observing the video picture monitor, perform adjustment so that the displayed data (CF ERROR) falls between 20 and 22 (hexadecimal) of the figure below. 	⊘RV3/PR-157 (A21) (CF error Adjustment)
STEP 3. • VTR: SYSTEM EE • Press the keys on the control panel in the following order. TEST , (PROC), (EE ON) • Oscilloscope 5V/DIV 5mS/DIV	TP4/PR-157 (A12) TP6/PR-157 (A14) 	(Check)

Conditions for alignment	Specifications	Adjustments
STEP 4. • Remove EX-138 extension board and reinstall PR-157 board to its original position, then confirm that the CF ERROR data displayed on the picture monitor is between 1E and 22 (hexadecimal). If it doesn't meet the specification, readjust STEP1.		
STEP 5. • Press the key on the control panel in the following order. SET UP/VIDEO OUT; (SCH) Confirm that the control panel display the SCH level of the EXT REF signal within ±20 degrees.		
STEP 6. • Switch S4-8/EN-99 (A19) ON.		

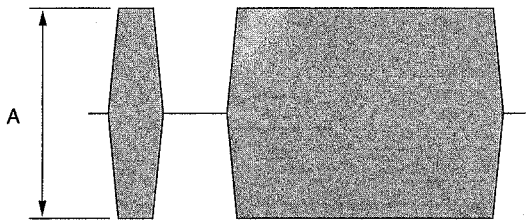
14-9. SC PHASE ALIGNMENT (PR-157 board)

Conditions for alignment	Specifications	Adjustments
STEP 1. • Connection: 14-2. Connection 1 •VTR: STOP (EE) • Input signal (REF VIDEO IN): BLACK BURST (RS-170A), 75-ohm terminated. • Switch/Jumper setting: Same as Sec. 14-2. • Control panel setting: VIDEO IN: (VIDEO) → INT SG (Free) VIDEO OUT: (SET UP) (REF) → REF VIDEO OUT: (SET UP) (SC) Other settings are the same as Sec. 14-2. • Oscilloscope 1V/DIV 50μS/DIV	TP17/PR-157 (B19)  • Adjust the level control so that the low level interval of TP17/PR-157 (B19) becomes minimum.	◐Level Control/ Function Control Panel
STEP 2. • Oscilloscope 1V/DIV 50μS/DIV	TP17/PR-157 (B19)  	◐RV4/PR-157 (D21)
STEP 3. • Press the (SC) key. • Vectorscope	• Confirm that the SC phase is changed more than 360±10 degrees on the vectorscope. • If they don't meet the specification, readjust from STEP 2.	◐Level Control/ Function Control Panel

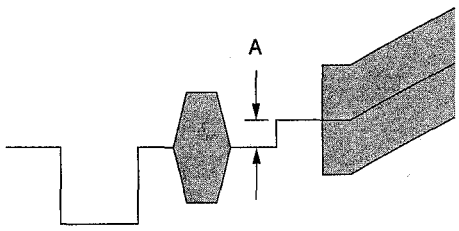
14-10. VIDEO A/D CONVERTOR REFERENCE VOLTAGE ALIGNMENT (AD-73 board)

Conditions for alignment	Specifications	Adjustments
STEP 1. • Connection: 14-2. Connection 1 • VTR: STOP (EE) • Input signal (ANALOG VIDEO IN): Free • Switch/Jumper setting: Same as Sec. 14-2. • Control panel setting: Same as Sec. 14-2. • Digital Voltmeter	TP4/AD-73 (B16) −2.00±0.01 Vdc	⊘ RV3/AD-73 (B16)
STEP 2. • After making alignments, perform the following alignments. 14-8. Video Input Offset Level Alignment (AD-73 board) 14-9. Video Input Level Alignment (AD-73 board)		

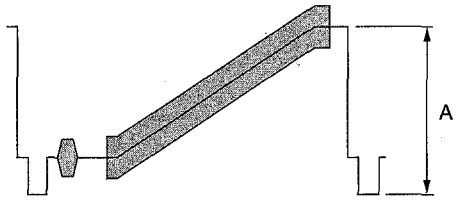
14-11. BURST TUNING ALIGNMENT (AD-73 board)

Conditions for alignment	Specifications	Adjustments
STEP 1. • Connection: 14-2. Connection 1 • VTR: STOP (EE) • Input signal (ANALOG VIDEO IN): Video signal with burst (RS-170A) • Switch/Jumper setting: Same as Sec. 14-2. • Control panel setting: Same as Sec. 14-2. • Oscilloscope 200mV/DIV 10μS/DIV	TP1/AD-73 (C8)  A=Maximum (≧800mVp-P)	⊘ LV2/AD-73 (C9)
STEP 2. • After making alignmint, perform the following alignments. 14-11. Video Sampling Phase Alignmint 14-13. Input Video Signal SC-H Phase Alignmint • 14-14. Input Video Signal Color Framing Alignmint		

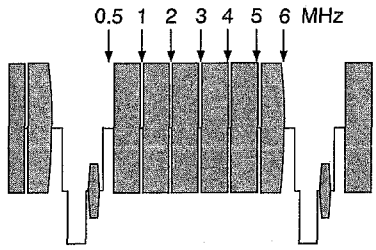
14-12. VIDEO INPUT OFFSET LEVEL ALIGNMENT (AD-73 board)

Conditions for alignment	Specifications	Adjustments
• Connection: 14-2. Connection 1 • VTR: STOP (EE) • Input signal (ANALOG VIDEO IN): LINEARITY (RS-170A) • Switch/Jumper setting: Same as Sec. 14-2. • Control panel setting: Same as Sec. 14-2. • ⊘ RV17/AD-73 (D1): Mechanical center • Waveform monitor	VIDEO OUTPUT 1  A=0±5mV	⊘ RV4/AD-73 (C21)

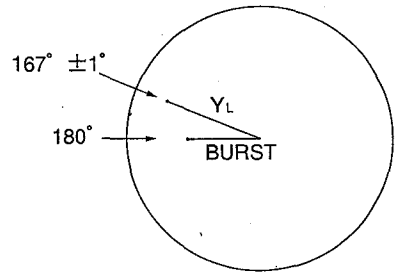
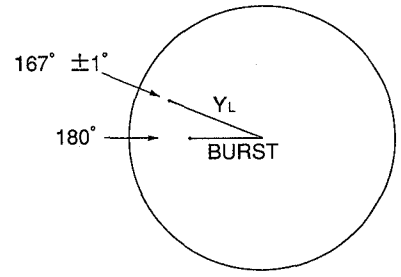
14-13 VIDEO INPUT LEVEL ALIGNMENT (AD-73 board)

Conditions for alignment	Specifications	Adjustments
• Connection: 14-2. Connection 1 • VTR: STOP (EE) • Input signal (ANALOG VIDEO IN): LINEARITY (RS-170A) • Switch/Jumper setting: Same as Sec. 14-2. • Control panel setting: Same as Sec. 14-2. • ⊘ RV7/AD-73 (C1): three o'clock position. • Waveform monitor	VIDEO OUTPUT 1  A=1.00±0.01V	⊘ RV6/AD-73 (C14)

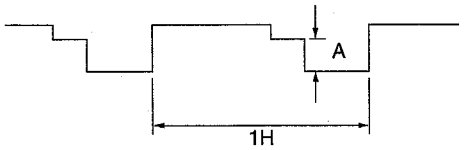
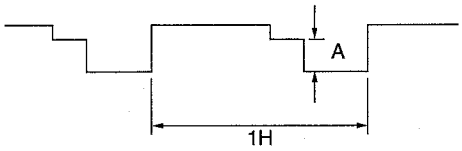
14-14. VIDEO A/D CONVERTER MATCHING ALIGNMENT (AD-73 board)

Conditions for alignment	Specifications	Adjustments
• Connection: 14-2. Connection 1 • VTR: STOP (EE) • Input signal (ANALOG VIDEO IN): H Sweep • Switch/Jumper setting: Same as Sec. 14-2. • Control panel setting: Same as Sec. 14-2. • Waveform monitor	VIDEO OUTPUT 1  0.5 to 5.5 MHz=Flat (Within ±2% based on 0.5 MHz.)	⊘ RV1/AD-73 (B16)

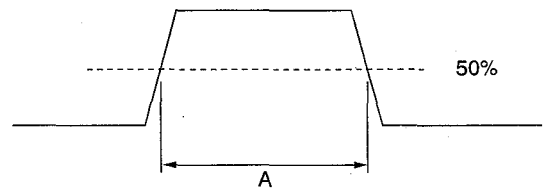
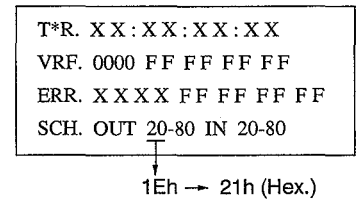
14-15. VIDEO SAMPLING PHASE ALIGNMENT (AD-73 board)

Conditions for alignment	Specifications	Adjustments
STEP 1. • Connection: 14-2. Connection 1 • VTR: STOP (EE) • Input signal (ANALOG VIDEO IN): COLOR BARS (RS-170A) • Switch/Jumper setting: Same as Sec. 14-2. • Control panel setting: Same as Sec. 14-2. • ⊘ RV16/AD-73 (D1): Mechanical Center • Vectorscope	VIDEO OUTPUT 1  	⊘ RV5/AD-73 (B17)
STEP 2. • Pull out the socket from JP1/AD-73 (C21) and insert it into JP2/AD-73 (C21). • Vectorscope	VIDEO OUTPUT 1  	⊘ RV9/AD-73 (E8)
STEP 3. • Pull out the socket from JP2/AD-73 (C21) and insert it into JP1/AD-73 (C21).		

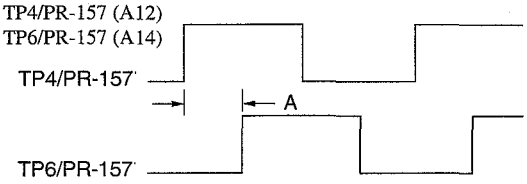
14-16. CF ERROR DETECTION ALIGNMENT (AD-73 board)

Conditions for alignment	Specifications	Adjustments
STEP 1. • Connection: 14-2. Connection 1 •VTR: STOP (EE) • Input signal (ANALOG VIDEO IN): Video signal with burst (RS-170A) • Switch/Jumper setting: S4-8/EN-99 (A19): OFF Other settings are the same as Sec. 14-2. • Control panel setting: Same as Sec. 14-2. • Oscilloscope 1V/DIV 10µS/DIV • Video picture monitor	TP2/AD-73 (G20)  A=Minimum≃0 Observing the video picture monitor, adjust so that the following data from 3E to 3F. Video picture monitor T*R. XX:XX:XX:XX VRF. 0000 FF FF FF FF ERR. XXXX FF FF FF FF SCH. OUT 20-80 IN 20-80 3Eh → 3Fh (Hex.)	◐ RV8/AD-73 (G17) ◐ RV13/AD-73 (G19)
STEP 2. • Oscilloscope 1V/DIV 10µS/DIV • Video picture monitor	TP2/AD-73 (G20)  A=Maximum Observing the video picture monitor, adjust so that the following data from 01 to 00. Video picture monitor T*R. XX:XX:XX:XX VRF. 0000 FF FF FF FF ERR. XXXX FF FF FF FF SCH. OUT 20-80 IN 20-80 01h → 00h (Hex.)	◐ RV11/AD-73 (G17) ◐ RV12/AD-73 (F19)
STEP 3. S4-8/EN-99 (A19): ON		
STEP 4. • Perform the following alignment 14-14. Input Video Signal Color Framing Alignment after making alignment.		

14-17. INPUT VIDEO SIGNAL SC-H PHASE ALIGNMENT (AD-73 board)

Conditions for alignment	Specifications	Adjustments
STEP 1. • Connection: 14-2. Connection 1 • VTR: STOP (EE) • Input signal (ANALOG VIDEO IN): Video signal with burst (RS-170A) • Switch/Jumper setting: S4-8/EN-99 (A19): OFF Other settings are the same as Sec. 14-2. • Control panel setting: Same as Sec. 14-2. • Oscilloscope 2V/DIV 50μS/DIV	IC45 pin 5/AD-73 (E11)  A=250±10nS	◐ RV14/AD-73 (F9)
STEP 2. Fine alignment • Video picture monitor	While observing the video picture monitor, perform the alignment so that the displayed data falls between 1E and 21 (hexadecimal) of the figure below. Video picture monitor  	◐ RV14/AD-73 (F9)
STEP 3. S4-8/EN-99 (A19): ON		
STEP 4. • Perform the following alignment 14-14. Input Video Signal Color Framing Alignment after making the alignment.		

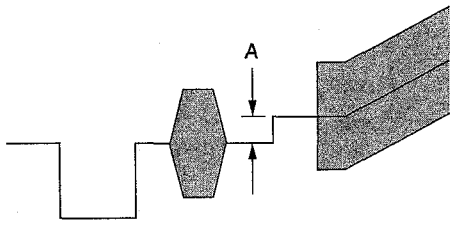
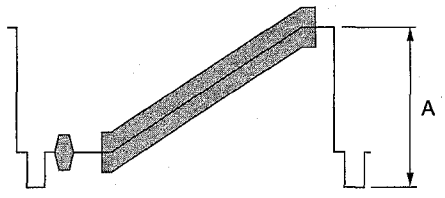
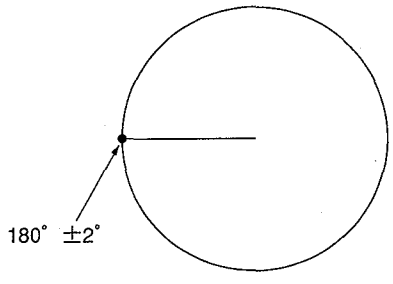
14-18. INPUT VIDEO SIGNAL COLOR FRAMING ALIGNMENT (AD-73 board)

Conditions for alignment	Specifications	Adjustments
STEP 1. • Connection: 14-2. Connection 1 •VTR: STOP (EE) • Input signal (ANALOG VIDEO IN): Video signal with burst (RS-170A) • Switch/Jumper setting: S4-8/EN-99 (A19): OFF Other settings are the same as Sec. 14-2. • Control panel setting: Same as Sec. 14-2. • Video picture monitor	Video picture monitor T*R. XX:XX:XX:XX VRF. 0000 FF FF FF FF ERR. XXXX FF FF FF FF SCH. OUT 20-80 IN 20-80 1Dh → 23h (Hex.)	◐ RV11/AD-73 (G17)
STEP 2. • VTR: SYSTEM EE • Control panel setting; TEST , (PROC), (EE ON) • Waveform Monitor	TP4/PR-157 (A12) TP6/PR-157 (A14)  A≒16.7 ms	◐ RV11/AD-73 (G17) Perform STEP 1 after adjusting ◐ RV11/AD-73 (G17), so that the specification be satisfied.
STEP 3. S4-8/EN-99 (A19): ON		

14-19 INTERNAL FREQUENCY ALIGNMENT (AD-73 board)

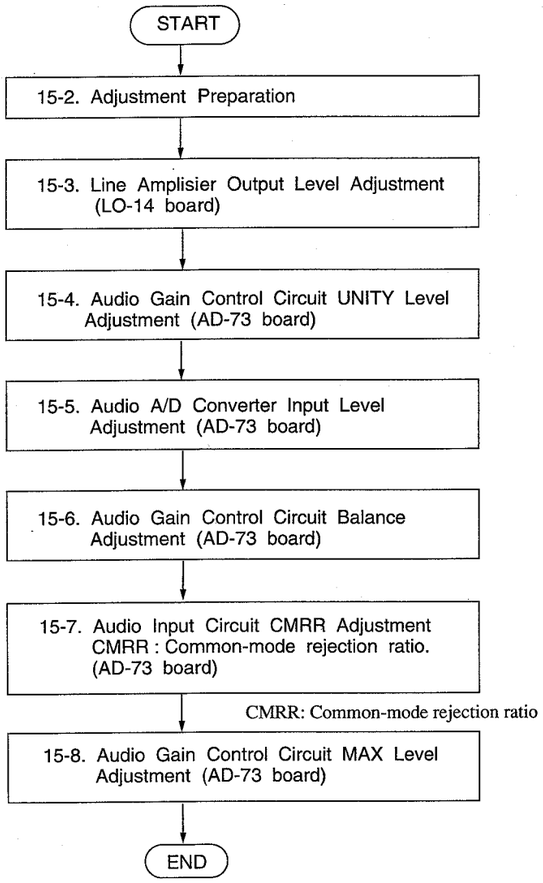
Conditions for alignment	Specifications	Adjustments
STEP 1. • Connection: 14-2. Connection 1 •VTR: STOP (EE) • Input signal (ANALOG VIDEO IN): Video signal with burst (RS-170A) • Switch/Jumper setting: Same as Sec. 14-2. • Control panel setting: Same as Sec. 14-2. • Oscilloscope 1V/DIV 20μS/DIV	TP7/AD-73 (D14)=A[V]	
STEP 2. • Disconnect the input signal. (or power off SG) • Waveform Monitor	TP7/AD-73 (D14)=A±10 mV	◐ RV8/AD-73 (E13)

14-20. MULTI-LOOPTEST USING ALIGNMENT (AD-73 board)

Conditions for alignment	Specifications	Adjustments
STEP 1. • Connection: 14-2. Connection 3 • Insert AD-73 board to the unit. • VTR: STOP (EE) • Switch/Jumper setting: Same as Sec. 14-2. • Control panel setting: [TEST] , (MULTI): Set the multi-looptest menu. (SOURCE): INT SG. → INT SG6 (MOD RAMP) Push the (Loop) and select ten times. Push [EXCUTE] and perform multi-looptest. Other settings are the same as Sec. 14-2. • Waveform Monitor	VIDEO OUTPUT 1 	◐RV17/AD-73 (D1) (SET UP Adjustment)
STEP 2. • VTR: STOP (EE) • Waveform Monitor	VIDEO OUTPUT 1  A=1.00±0.01V	◐RV7/AD-73 (C1) (LEVEL Adjustment)
STEP 3. • VTR: STOP (EE) • Vectorscope	VIDEO OUTPUT 1 	◐RV16/AD-73 (D1) (HUE Adjustment)

SECTION 15
AUDIO SIGNAL SYSTEM ALIGNMENT

15-1. ALIGNMENT SEQENCE

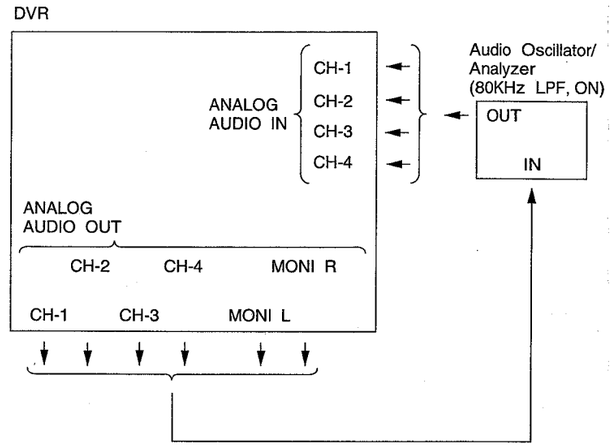


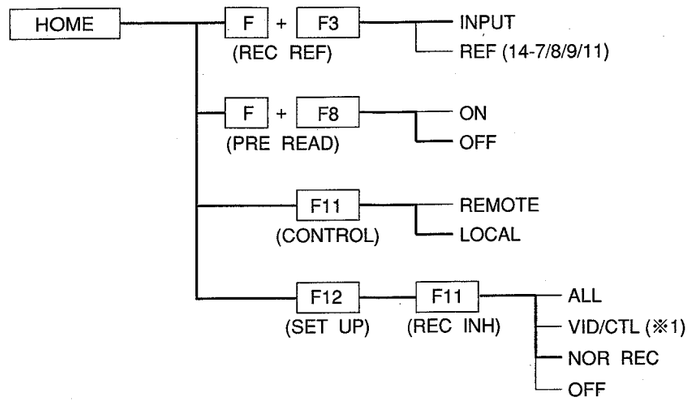
15-2. ALIGNMENT PREPARATION

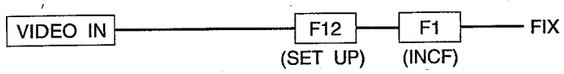
[Eguipment Required]

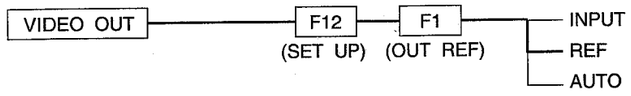
- Audio Oscillator/Analyzer: (Eguivalent product: TM5006/ Tektromix)

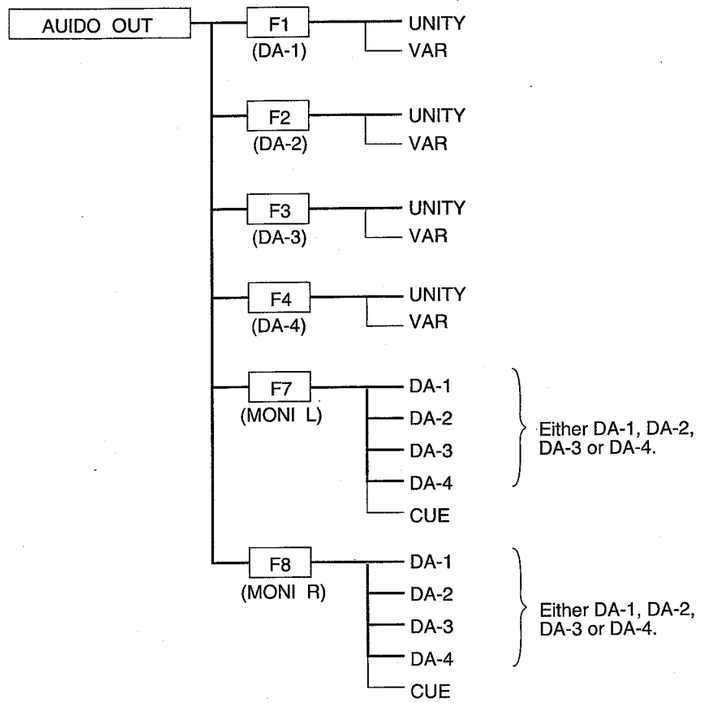
[Connection]











*1. This can be set by the USER HOLE of the cassette.
*2. In the DVR-C20, ANALOG mode cannot be selected.
*3. The content is displayed when DVR-20/C20/20P/C20P are mounted.
*4. The content is displayed when DVR-28/28P are mounted.
*5. The content in parentheses can be selected only when BKDV-105/106/205/206 are mounted.
BKDV-105 : Corresponding to DVR-28
BKDV-106 : Corresponding to DVR-28
BKDV-205 : Corresponding to DVR-20/C20
BKDV-206 : Corresponding to DVR-20P/C20P

[Control Panel Setting]

HOME: (REC REF) → INPUT
(PRE READ) → OFF
(CONTROL) → LOCAL
AUDIO IN: (DA-1) → UNITY
(DA-2) → UNITY
(DA-3) → UNITY
(DA-4) → UNITY
(EMPHASIS) → OFF

AUDIO OUT: (DA-1) → UNITY
(DA-2) → UNITY
(DA-3) → UNITY
(DA-4) → UNITY
(MONI L) → DA-1~DA-4
(MONI R) → DA-1~DA-4

(REC INH) → OFF
SET UP/VIDEO IN: (IN CF) → FIX
SET UP/VIDEO OUT: (OUT REF) → REF
SET UP/AUDIO IN: (DA-1) → ANALOG
(DA-2) → ANALOG
(DA-3) → ANALOG
(DA-4) → ANALOG

[Switch/Jumper Initial Setting]

AD-73 BOARD

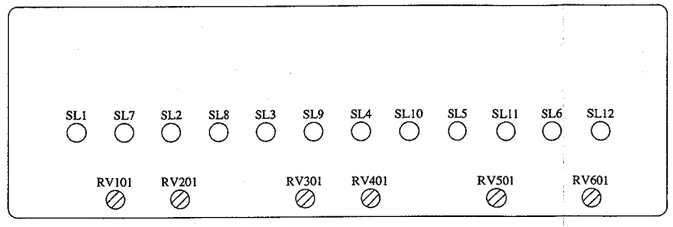
JP1/2.....JP1
JP201, 301, 401, 501.....SHORT
JP202, 302, 402, 502.....OPEN
JP203, 303, 403, 503.....OPEN
JP204, 304, 404, 504.....OPEN
JP205, 305, 405, 505.....SHORT
JP206, 306, 406, 506.....OPEN
JP207, 307, 407, 507.....OPEN

LO-14 BOARD

SL1.....OPEN
SL2.....OPEN
SL3.....OPEN
SL4.....OPEN
SL5.....OPEN
SL6.....OPEN
SL7.....OPEN
SL8.....ZOPEN
SL9.....OPEN
SL10.....OPEN
SL11.....OPEN
SL12.....OPEN

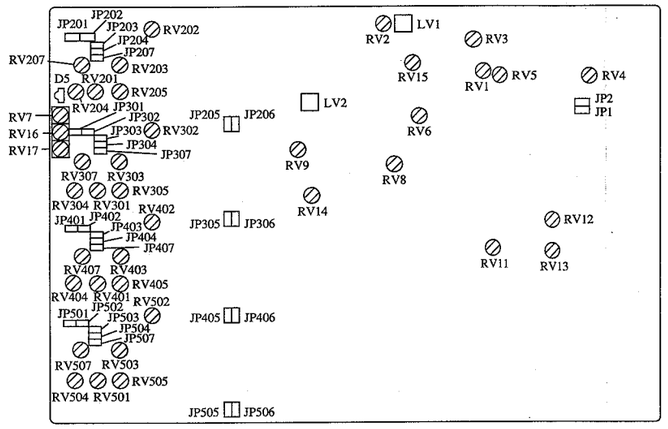
[Location]

LO-14 Board



B SIDE

AD-73 Board



A SIDE

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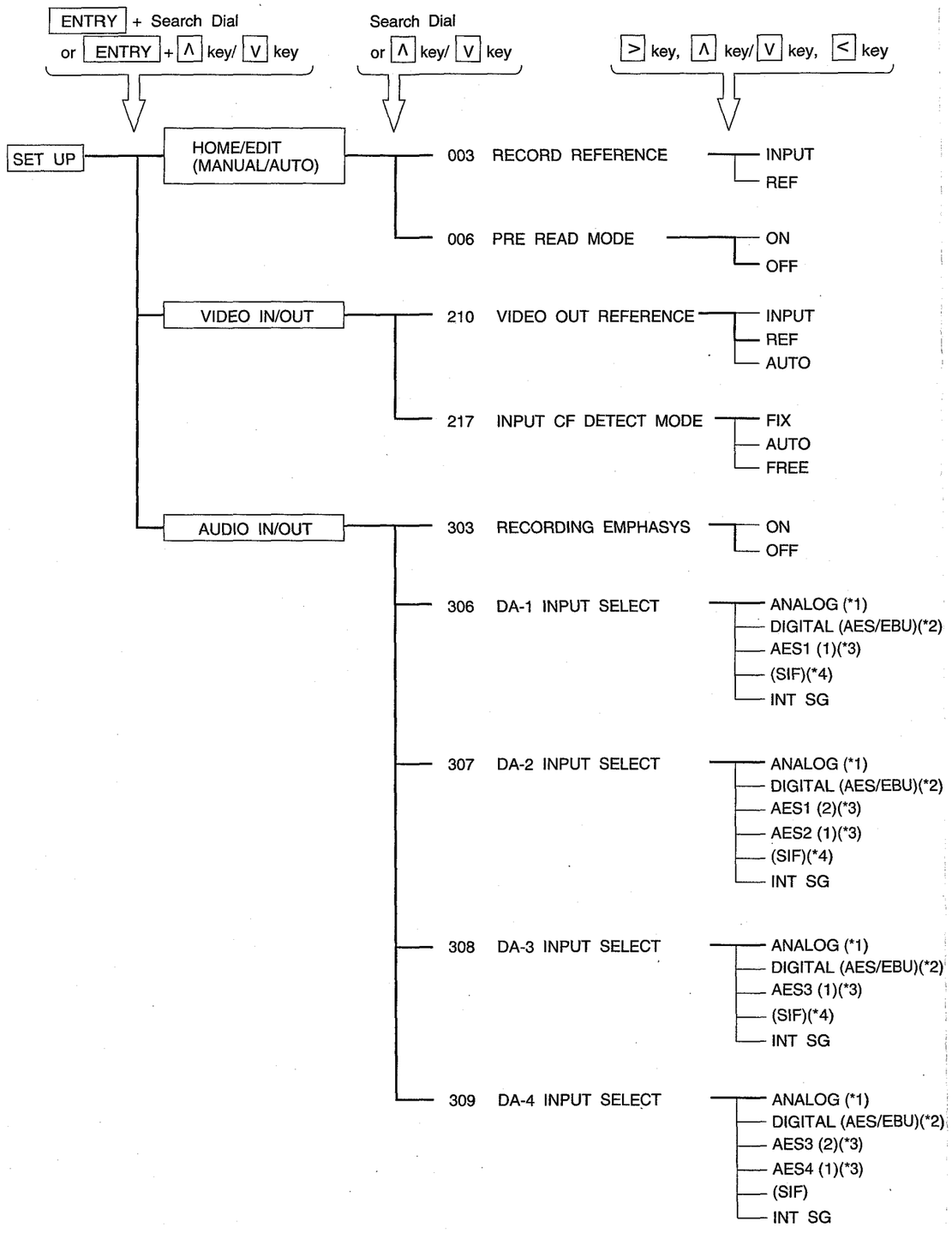

- LOCAL/REMOTE select button
  - LOCAL
  - REMOTE
- REC INH switch
  - ON
  - OFF
- REC level adjustment knob DA-1
  - Push it in — UNITY
  - Pull it out — VARIABLE (15-8)
- REC level adjustment knob DA-2
  - Push it in — UNITY
  - Pull it out — VARIABLE (15-8)
- REC level adjustment knob DA-3
  - Push it in — UNITY
  - Pull it out — VARIABLE (15-8)
- REC level adjustment knob DA-4
  - Push it in — UNITY
  - Pull it out — VARIABLE (15-8)
- PB level adjustment knob DA-1
  - Push it in — VARIABLE
  - Pull it out — UNITY
- PB level adjustment knob DA-2
  - Push it in — VARIABLE
  - Pull it out — UNITY
- PB level adjustment knob DA-3
  - Push it in — VARIABLE
  - Pull it out — UNITY
- PB level adjustment knob DA-4
  - Push it in — VARIABLE
  - Pull it out — UNITY
- PB level adjustment knob CUE
  - Push it in — VARIABLE
  - Pull it out — UNITY

- Press one of the keys, DA1-DA4, located on the left side of the audio monitor channel selection key section.
- Press one of the keys, DA1-DA4, on the right side of the audio monitor channel selection key section.

*1. In the DVR-C20, ANALOG mode cannot be selected.
*2. The content is displayed when DVR-20/C20/20P/C20P are mounted.
*3. The content is displayed when DVR-28/28P are mounted.
*4. The content can be selected only when BKDV-105/106/205/206 are mounted.

BKDV-105 : Corresponding to DVR-28
BKDV-106 : Corresponding to DVR-28
BKDV-205 : Corresponding to DVR-20/C20
BKDV-206 : Corresponding to DVR-20P/C20P

15-3. LINE AMPLIFIER OUTPUT LEVEL ALIGNMENT (LO-14 board)

Conditions for alignment	Specifications	Adjustments
• Connection: Same as Sec. 15-2. • VTR: STOP (EE) • Switch/Jumper setting: Same as Sec. 15-2. • Control panel setting: SET UP/AUDIO IN (DA-1) → INT SG (DA-2) → INT SG (DA-3) → INT SG (DA-4) → INT SG Other settings are same as Sec. 15-2. • Audio Oscillator/Analyzer	ANALOG AUDIO OUTPUT CH-1=+8.0±0.1 dBm CH-2=+8.0±0.1 dBm CH-3=+8.0±0.1 dBm CH-4=+8.0±0.1 dBm MONITOR L=+8.0±0.1 dBm MONITOR R=+8.0±0.1 dBm	⊘ RV101/LO-14 (A1) (CH-1 Alignment) ⊘ RV201/LO-14 (B1) (CH-2 Alignment) ⊘ RV301/LO-14 (C1) (CH-3 Alignment) ⊘ RV401/LO-14 (D1) (CH-4 Alignment) ⊘ RV501/LO-14 (F1) (MONITOR L Alignment) ⊘ RV601/LO-14 (E1) (MONITOR R Alignment)

15-4. AUDIO GAIN CONTROL CIRCUIT UNITY LEVEL ALIGNMENT (AD-73 board)

Conditions for alignment	Specifications	Adjustments
• Connection: Same as Sec. 15-2. • VTR: STOP (EE) • Switch/Jumper setting: Same as Sec.15-2. • Control panel setting: Same as Sec. 15-2. • Oscilloscope 20 mV/DIV 10 μS/DIV	CH-1; TP-203/AD-73 (B2) 0±4 mVdc CH-2; TP-303/AD-73 (E2) 0±4 mVdc CH-3; TP-403/AD-73 (H2) 0±4 mVdc CH-4; TP-503/AD-73 (K2) 0±4 mVdc	⊘ RV202/AD-73 (B3) (CH-1) ⊘ RV302/AD-73 (D3) (CH-2) ⊘ RV402/AD-73 (G3) (CH-3) ⊘ RV502/AD-73 (K3) (CH-4)

15-5. AUDIO A/D CONVERTOR INPUT LEVEL ALIGNMENT (AD-73 board)

Conditions for alignment	Specifications	Adjustments
• Connection: Same as Sec. 15-2. • VTR: STOP (EE) • Input signal (ANALOG AUDIO IN): 1 kHz/+8 dBm • Switch/Jumper setting: Same as Sec. 15-2. • Control panel setting: Same as Sec. 15-2. • Audio Oscillator/Analyzer	ANALOG AUDIO OUTPUT CH-1=+8.0±0.1 dBm CH-2=+8.0±0.1 dBm CH-3=+8.0±0.1 dBm CH-4=+8.0±0.1 dBm	⊘ RV207/AD-73 (B1) (Audio reference level CH-1 Alignment) ⊘ RV307/AD-73 (E1) (Audio reference level CH-2 Alignment) ⊘ RV407/AD-73 (G1) (Audio reference level CH-3 Alignment) ⊘ RV507/AD-73 (K1) (Audio reference level CH-4 Alignment)

15-6. AUDIO GAIN CONTROL CIRCUIT BALANCE ALIGNMENT (AD-73 board)

Conditions for alignment	Specifications	Adjustments
• Connection: Same as Sec. 15-2. • VTR: STOP (EE) • Input signal (ANALOG AUDIO IN): 1 kHz/+27.5 dBm • Switch/Jumper setting: Same as Sec. 15-2. • Control panel setting: Same as Sec. 15-2. • Set the follwing adjustments to their respective mechanical centers. CH-1; ⊘ RV204/AD-73 (C1) CH-2; ⊘ RV304/AD-73 (E1) CH-3; ⊘ RV404/AD-73 (H1) CH-4; ⊘ RV505/AD-73 (L1) • Audio Oscillator/Analyzer	ANALOG AUDIO OUTPUT CH-1; Distortion=Min (≦0.02%) CH-2; Distortion=Min (≦0.02%) CH-3; Distortion=Min (≦0.02%) CH-4; Distortion=Min (≦0.02%)	⊘ RV205/AD-73 (C2) (CH-1) ⊘ RV305/AD-73 (E2) (CH-2) ⊘ RV405/AD-73 (H2) (CH-3) ⊘ RV505/AD-73 (L2) (CH-4) (VCA THD Alignment)

15-7. AUDIO INPUT CIRCUIT CMRR LEVEL ALIGNMENT (AD-73 board)

Conditions for alignment	Specifications	Adjustments
STEP 1. • Connection: Same as Sec. 15-2. • VTR: STOP (EE) • Input signal (ANALOG AUDIO IN): 1 kHz/+8 dBm • Switch/Jumper setting: Same as Sec. 15-2. • Control panel setting: Same as Sec. 15-2. • Set an audio oscillator/analyzer to common mode. (If not, disconnect the cold side (Y) of connector and short between the hot side (X) of connector and it.)	ANALOG AUDIO OUTPUT CH-1; Level=Min (≦−50 dB) CH-2; Level=Min (≦−50 dB) CH-3; Level=Min (≦−50 dB) CH-4; Level=Min (≦−50 dB)	⊘ RV201/AD-73 (C1) (CH-1) ⊘ RV301/AD-73 (E1) (CH-2) ⊘ RV401/AD-73 (H1) (CH-3) ⊘ RV501/AD-73 (L1) (CH-4) (COMMON MODE NOISE REJECTION Alignment)
STEP 2. • Input signal (ANALOG AUDIO IN): 1 kHz/+27.5 dBm • Set an audio oscillator/analyzer to differential mode.	ANALOG AUDIO OUTPUT CH-1; Distortion=Min (≦0.02%) CH-2; Distortion=Min (≦0.02%) CH-3; Distortion=Min (≦0.02%) CH-4; Distortion=Min (≦0.02%)	⊘ RV204AD-73 (C1) (CH-1) ⊘ RV304/AD-73 (E1) (CH-2) ⊘ RV404/AD-73 (H1)(CH-3) ⊘ RV504/AD-73 (L1) (CH-4) (VCA THD Alignment)

15-8. AUDIO GAIN CONTROL CIRCUIT MAX LEVEL ALIGNMENT

Conditions for alignment	Specifications	Adjustments
• Connection: Same as Sec. 15-2. • VTR: STOP (EE) • Input signal (ANALOG AUDIO IN): 1 kHz/+8 dBm • Switch/Jumper setting: Same as Sec. 15-2. • Control panel setting AUDIO IN: (DA-1)→ VAR (MAX) (DA-2)→ VAR (MAX) (DA-3)→ VAR (MAX) (DA-4)→ VAR (MAX) Other settings are the same as Sec. 15-2.	ANALOG AUDIO OUTPUT CH-1; Level=20±0.1 dBm CH-2; Level=20±0.1 dBm CH-3; Level=20±0.1 dBm CH-4; Level=20±0.1 dBm	◐ RV203/AD-73 (B2) (CH-1) ◐ RV303/AD-73 (E2) (CH-2) ◐ RV403/AD-73 (G2) (CH-3) ◐ RV503/AD-73 (K2) (CH-4)

DVR-20 (UC)
3-170-770-02 Volume-1

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Broadcast Products Group

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SP00960

SERVICE MANUAL
S E G

SONY

DIGITAL VIDEOCASSETTE RECORDER

DVR-20P

SUPPLEMENT-1

SUBJECT

Addition of Documents

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APPLICABLE MANUALS/SERIAL NUMBERS

DVR-20P (EK, UC) MAINTENANCE MANUAL
VOL-2 1st Edition
VOL-2 1st Edition (Revised-1)

Above manuals are packed with the following machines.
DVR-20P (EK): #10001 to #10699
DVR-20P (UC): #10001 to #10399

D-2

Composite Digital
MAINTENANCE MANUAL

DVR-20P (EK, UC)
9-967-409-01

Sony Corporation
Broadcast Products Group

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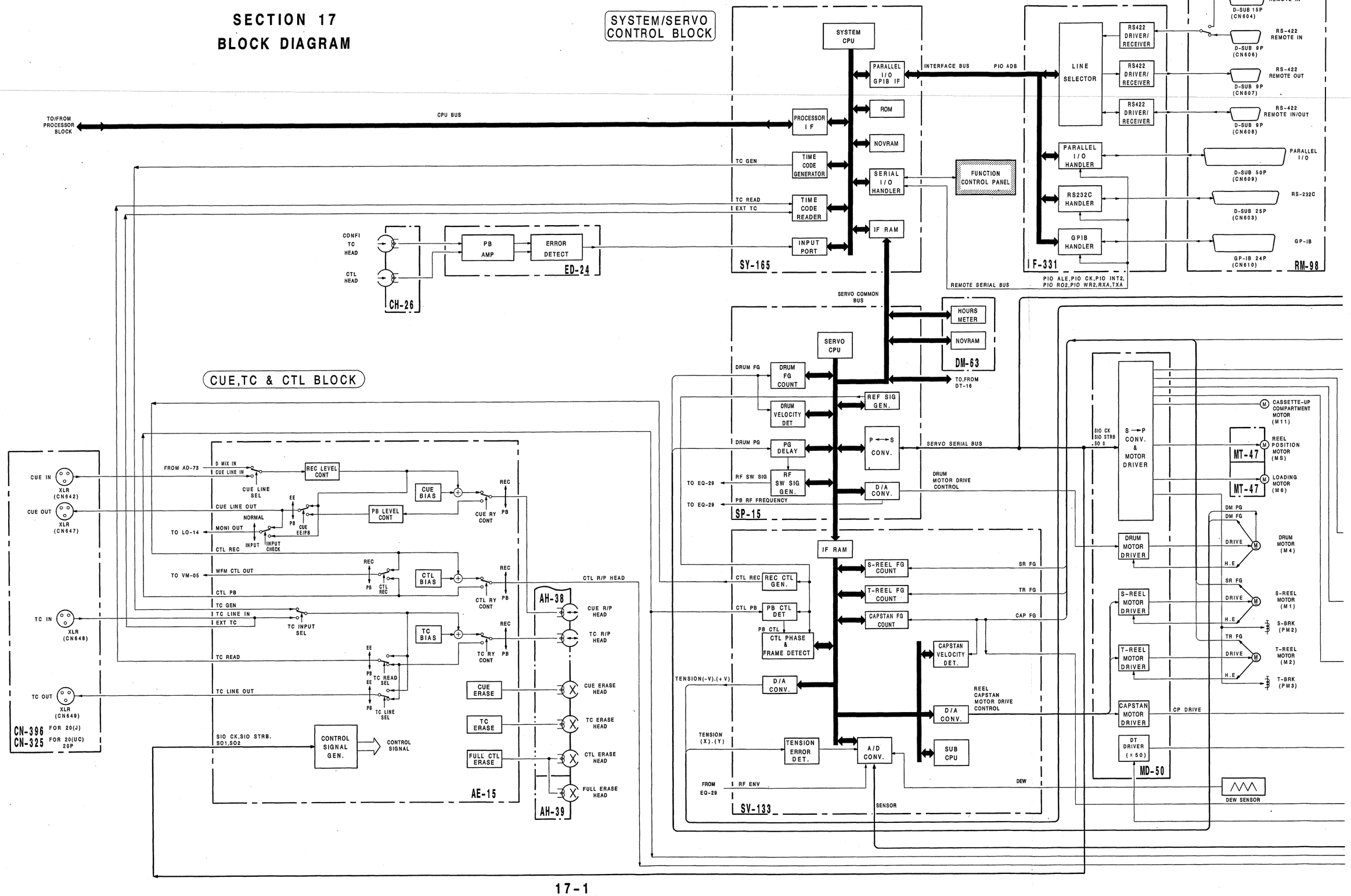

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RS-422 REMOTE IN
9P
RS-422 REMOTE OUT
9P
RS-422 REMOTE IN/OUT
9P
PARALLEL I/O
50P
RS-232C
25P
GP-IB
24P
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SENSOR BLOCK

ROM
NOVRAM
CPU
A/D CONVERTER
S-USG DRIVER
T-USG DRIVER
TEMPERATURE SENSOR
PWM D/A CONVERTER
OFFSET
CONTROL
VCO
GAIN CONTROLLER
UC-2

S-USG (Ultra Sonic Guide)
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SI OL
SI OH
EJECT LAMP
LED CONT
SIO CK
SIO STRB
S ← P CONV.
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REEL POSI (M)
USER CENTER(S)
USER CENTER(M)
USER-S
USER-T
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CASS DOWN
CASS IN
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FOR 20P(PAL)
TAPE
1 FIELD
A B C D A B C D A B C D A B C D
DRUM MOTION

FOR 20 (NTSC)
TAPE
1 FIELD
A B C D A B C D A B C D
DRUM MOTION

TENSION (-V).(+V)
CN-590
TENSION (X).(Y)
DET-19
S-TENSION SENSOR

TENSION (-V).(+V)
TENSION (X).(Y)
DET-18
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REEL POSITION MOTOR (M5)
LOADING MOTOR (M6)
DRUM MOTOR (M4)
S-REEL MOTOR (M1)
S-BRK (PM2)
T-REEL MOTOR (M2)
T-BRK (PM3)
NSOR

CP FG
CN-171
CAPSTAN PINCH (PM1)
PINCH DRIVER
PD-53
CAPSTAN PINCH SUB (PM6)
BLADE DRIVER
PD-53
TAPE CLEANER (PM5)
CN-309
CLEANING ROLLER (PM4)
CAPSTAN MOTOR
(M3)
CP DRIVE
CTL R/P HEAD
AH-38

D C
DT
ERASE
A B
REC
REC
ERASE
DT
A B

FROM DE-37(DVR-20) DE-36(DVR-20P)
FROM DE-37(DVR-20) DE-36(DVR-20P)
B/D SYNC
A/C SYNC
STG
TRACKING CONTROL
FEED BACK LOOP
DRE
FROM DE-37(DVR-20) DE-36(DVR-20P) FROM EQ-29
TRACK ID
RF ENV
CTL PB
CP FG
(U-COMPUTER) SLANT CONPENSATION TRACE JUMP CONTROL
DT-16

(RV001) POTENTIONMETER THREADING

OVERALL BLOCK DIAGRAM (1/2)

DVR-20 (J) ;#10001-
DVR-20 (UC);#10001-
DVR-20P ;#10001-

OVERALL(2/2) BLOCK DIAGRAM

OPTION

SERIAL INTERFACE BLOCK

SERIAL DATA IN

SERIAL DATA

S → P DECODER

SERIAL DATA

PARALLEL VIDEO DATA

AUDIO TIMEBASE EXPANSION

SERIAL AUDIO DATA

PARALLEL VIDEO DATA

DATA MIX

P → S ENCODER

SERIAL DATA

SERIAL AUDIO DATA

AUDIO TIME BASE COMPRESSION

DI F-10 (OPTION)

ACTIVE THROUGH OUT

SERIAL DATA OUT1

SERIAL DATA OUT2

SERIAL DATA OUT3

ENCODER BLOCK

ANALOG VIDEO INPUT

VIDEO A/D AUDIO A/D,D/A CONVERTER BLOCK

GAIN CONT & PEDESTAL CLAMP

A/D CONVERTER

BUFFER

D/A

SYNC & SC SEP.

GEN LOCK

CK SELECT

CK(4FSC)

ERROR DET.

PLL

CK CONTROL BLOCK

CPU BUS

SYSTEM CONTROL INTERFACE

CF CONTROL BLOCK

INPUT STATE GEN.

IN SYNC

IN BURST

IN F0

IN F1

IN F2

IN FLD

IN ZERO

DIGITAL VIDEO DATA

VITC GENERATOR

VIDEO INPUT SELECTOR

VITC INSERTION

DIGITAL SYNC SEP.

VIDEO PATTERN GENERATOR

CLOCK TIMING SELECTOR

AUDIO CLOCK PLL

VIDEO 4H DELAY

VIDEO INTER LINE SHUFFLE

VIDEO OUTER PARITY

ADD

CH-A/C SECTOR ARRAY SHUFFLE

CH-A/C INNER PARITY & SYNC &ID ADD

REC MODE

DELAY

CPU DATA DECODER

AUX DATA

AUDIO BIT CONV. 20bit→8bit

AUDIO AUX DATA MULTIPLEX

AUDIO OUTER PARITY

CH-B/D SECTOR ARRAY SHUFFLE & DELAY

CH-B/D INNER PARITY & SYNC & ID ADD

ERROR PATTERN GENERATOR

4Ø+

M²ENCODE 8bit→1bit

A/C-CH REC DATA

B/D-CH REC DATA

M²CK

A/C HEAD SEL

B/D HEAD SEL

REC TIMING GEN.

REC TIMING

ERASE TIMING

TO REC/EQ

TO REC

LATCH

LATCH

EQ

DR-135

DR-135

DR-175

DR-136

DR-137

DR-136

DR-137

DR-132

DR-134

D-CH PB AMP

C-C PB A

ROTARY HEAD RELAYING

ROTARY TRANSFORMER

DR-151

DR-152

ROTARY HEAD RELAYING

A-CH ERASE AMP

B-CH ERASE AMP

C-CH ERASE AMP

D-CH ERASE AMP

A-CH REC AMP

B-CH REC AMP

C-CH REC AMP

D-CH REC AMP

OSC

REC-11

DIGITAL AUDIO DATA

AUDIO SIGNAL GENERATOR

AUDIO INPUT SELECTOR

AUDIO LEVEL CONTROL

CROSSFADER

AUDIO LEVEL CONTROL

PB/EE SELECT

AUDIO LEVEL DETECT

AES/EBU INTERFACE

CPU BUS

DIAGNOSTIC

CPU

4FV

EN-99

FROM PR-157(DVR-20)
PR-163(DVR-20P)

ANALOG AUDIO IN CH1,CH2,CH3,CH4

XCRx 4 (CN638,CN639,CN640,CN641)

CN-396 FOR 20(J)

CN-325 FOR 20(UC) 20P

GAIN CONTROL & DC CUT

EMPHASIS

A/D CONVERTER

DIGITAL FILTER

SERIAL INTERFACE

GAIN(CH1-CH4)

CK

SERIAL INTERFACE

CH1,CH2

CH3,CH4

MONITOR L,R

D MIX

DIGITAL FILTER

D/A CONVERTER

LPF

DE-EMPHASIS

BUFFER

D MIX

TO AE-15

DIGITAL AUDIO DATA

AD-73

DIGITAL VIDEO IN

RM-98

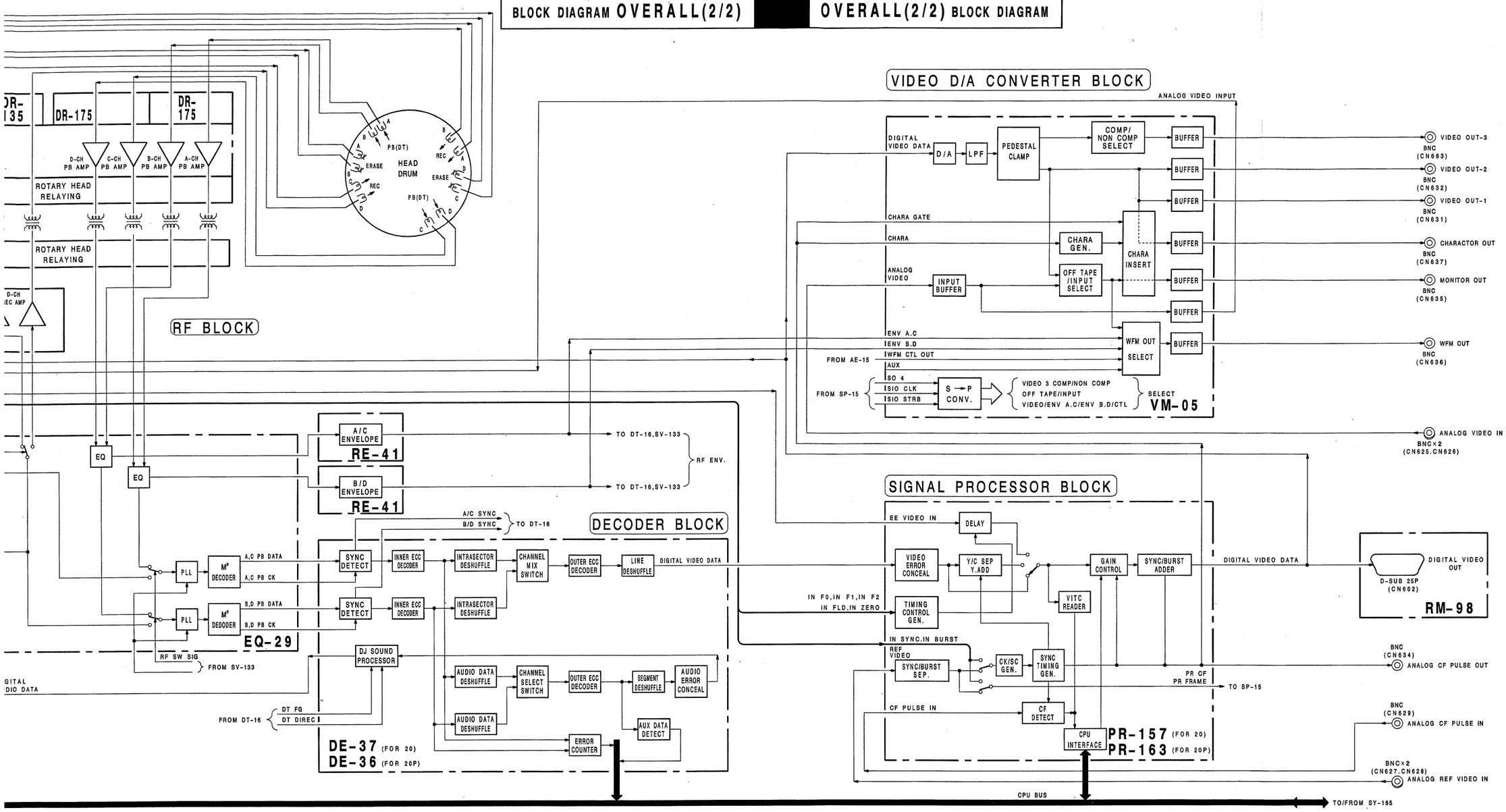
D-SUB 25P (CN601)

DIGITAL AUDIO IN CH1/2,CH3/4

XCRx 2 (CN620,CN621)

CN-233

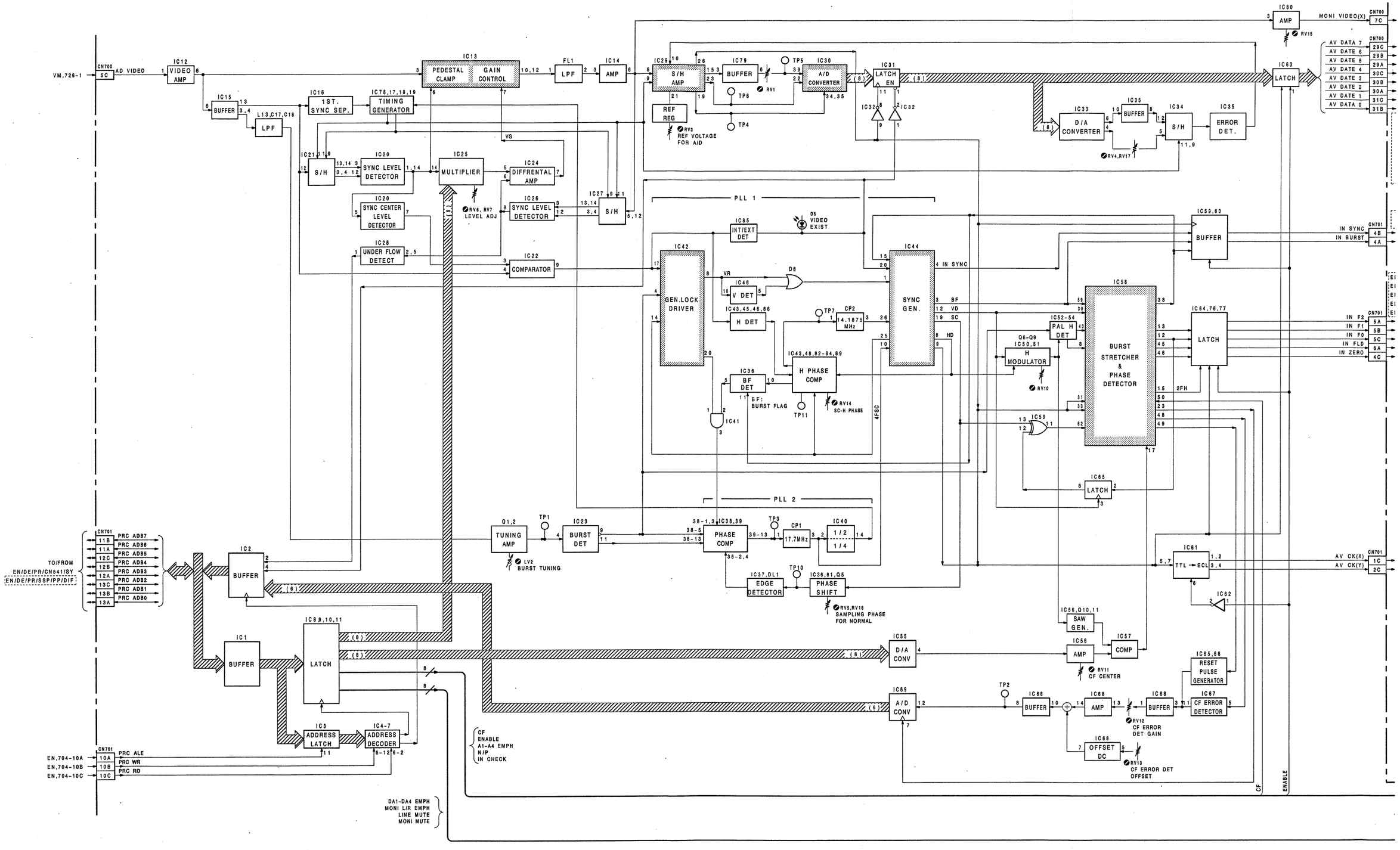
OVERALL(2/2) BLOCK DIAGRAM



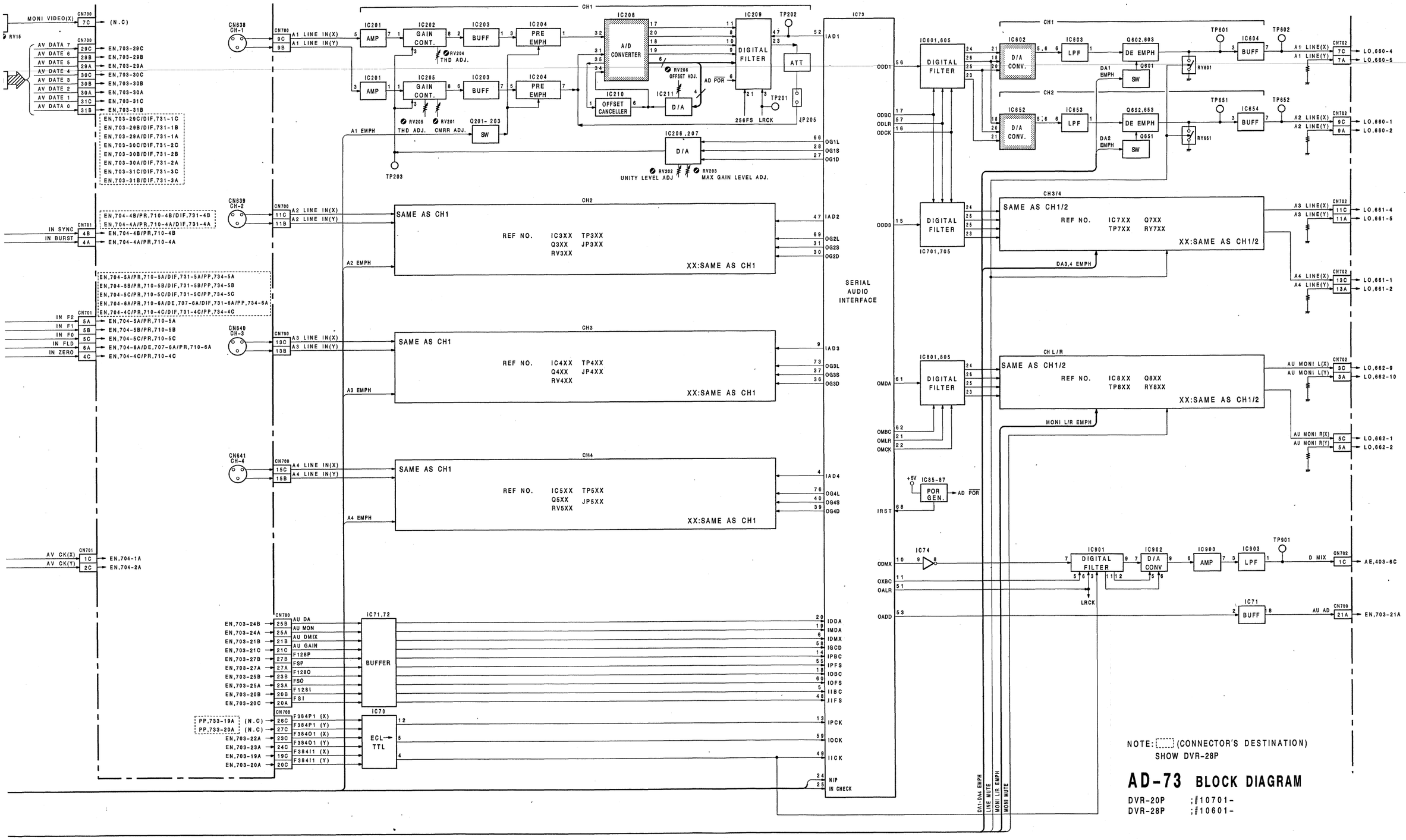
OVERALL BLOCK DIAGRAM (2/2)

DVR-20 (J) ;#10001-
DVR-20 (UC);#10001-
DVR-20P ;#10001-

S/N;10701 and higher(20P)
S/N;10601 and higher(28P)



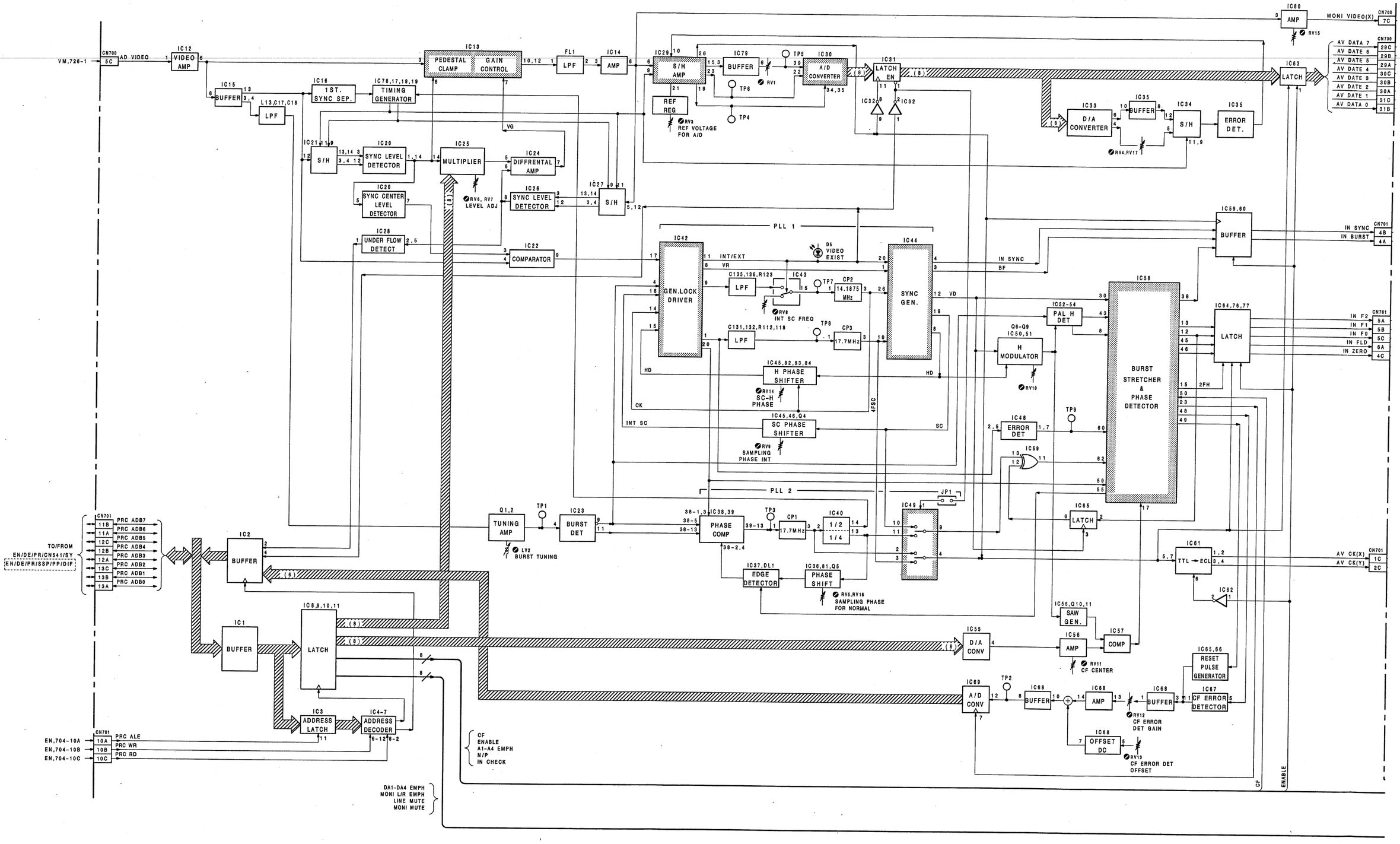
17-3(b)

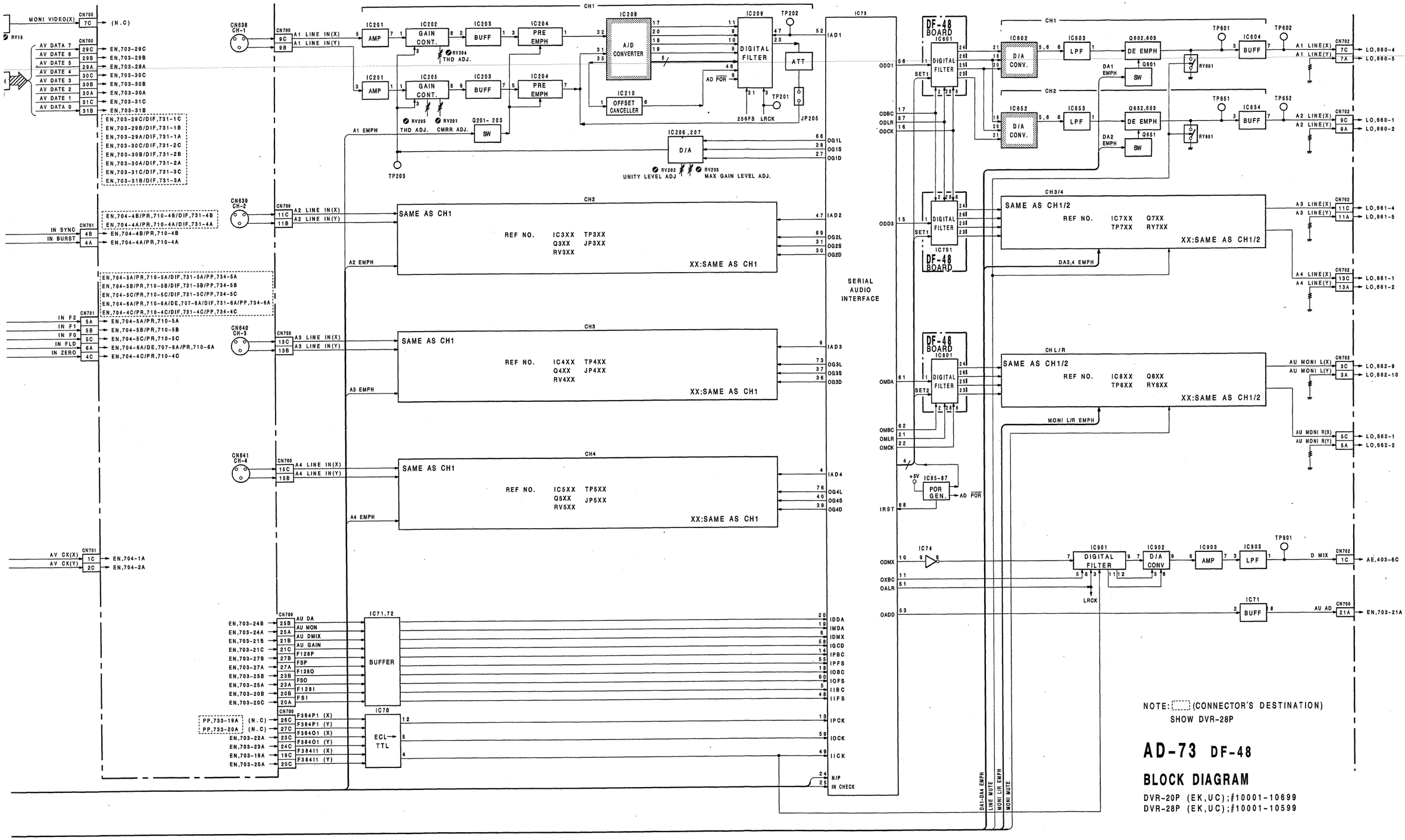


AD-73 BLOCK DIAGRAM

DVR-20P ;#10701-
DVR-28P ;#10601-

S/N;10001 through 10699(20P)
S/N;10001 through 10599(28P)



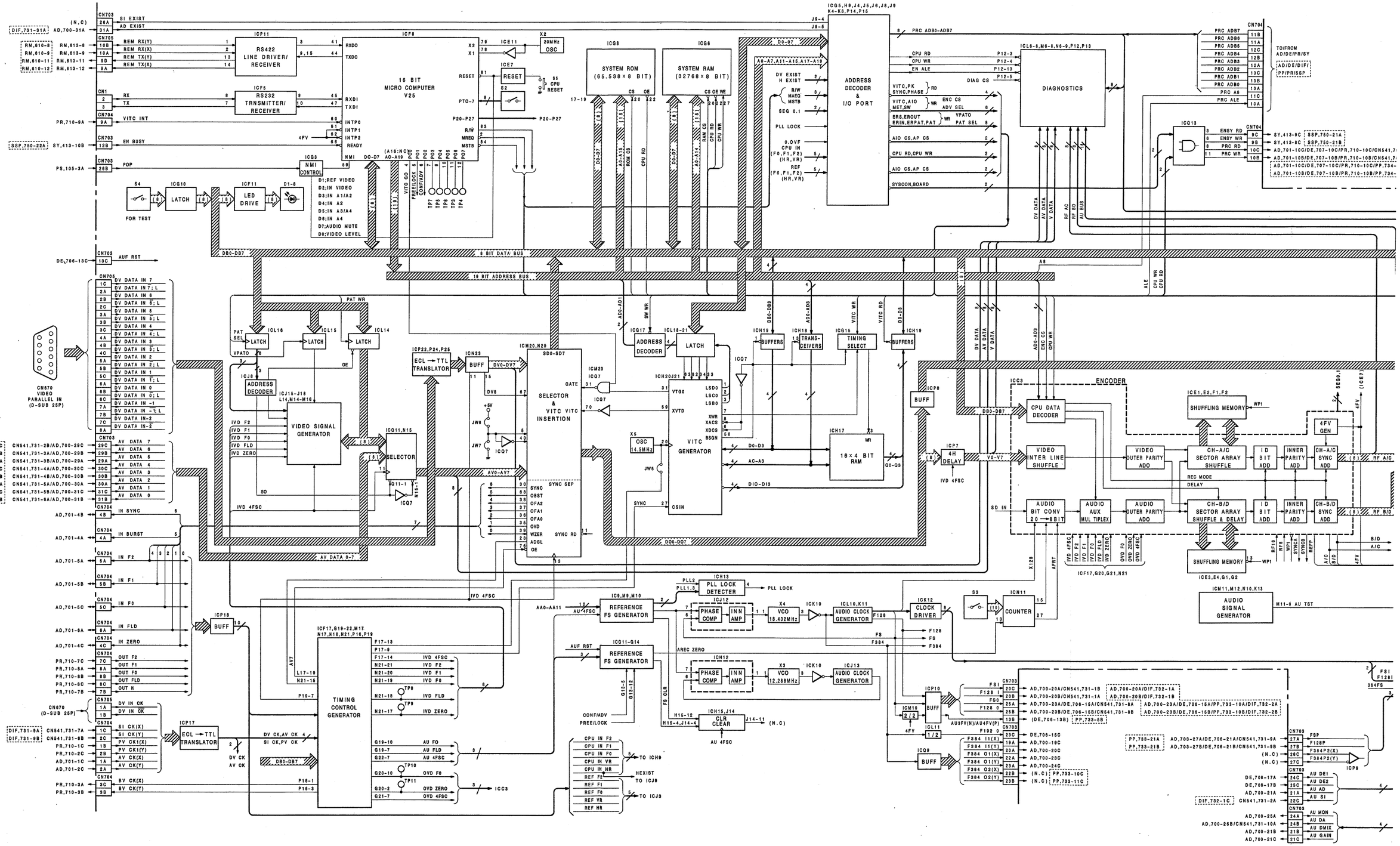


NOTE: [ ] (CONNECTOR'S DESTINATION)
SHOW DVR-28P

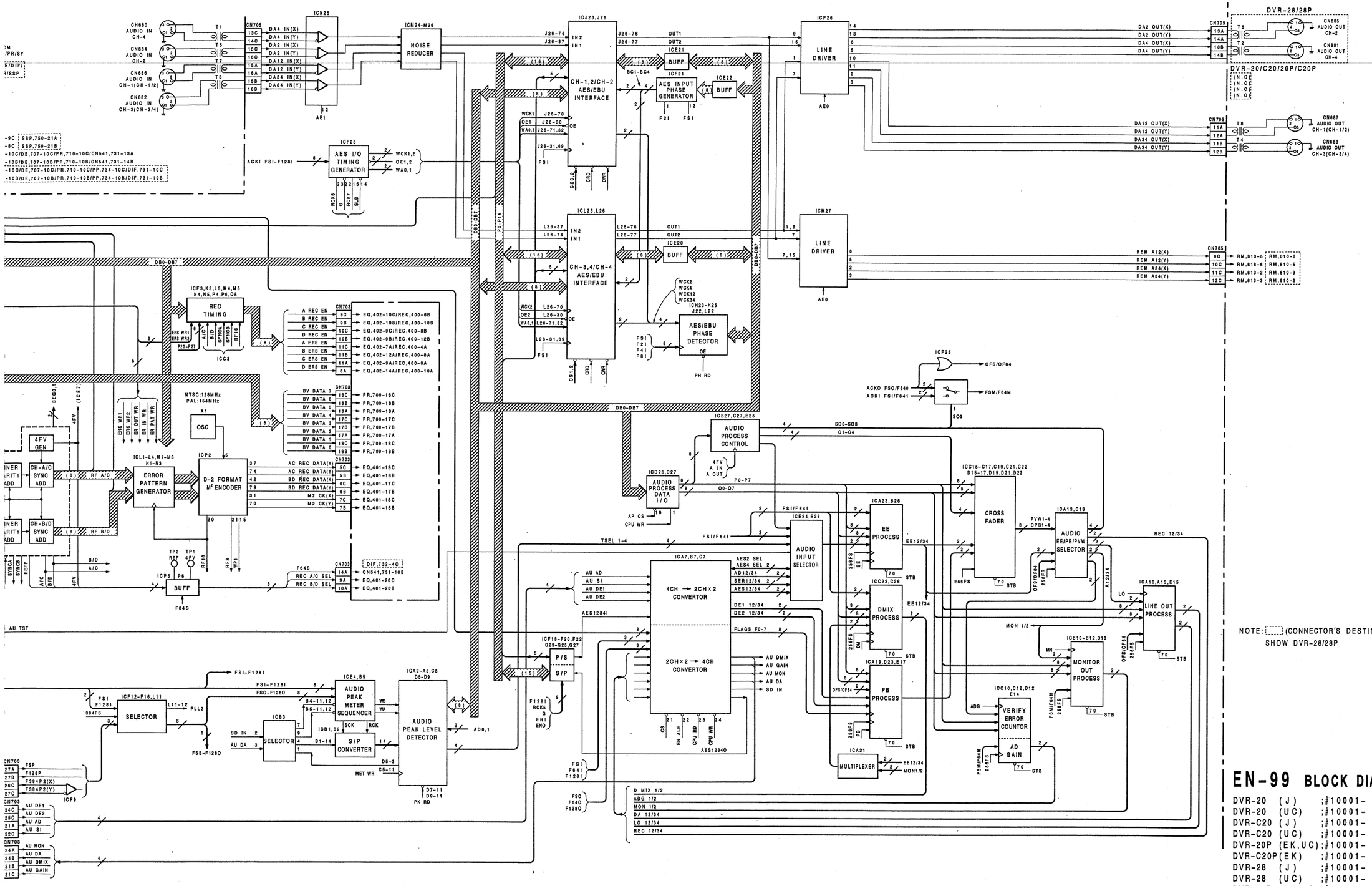
AD-73 DF-48

BLOCK DIAGRAM

DVR-20P (EK,UC); #10001-10699
DVR-28P (EK,UC); #10001-10599

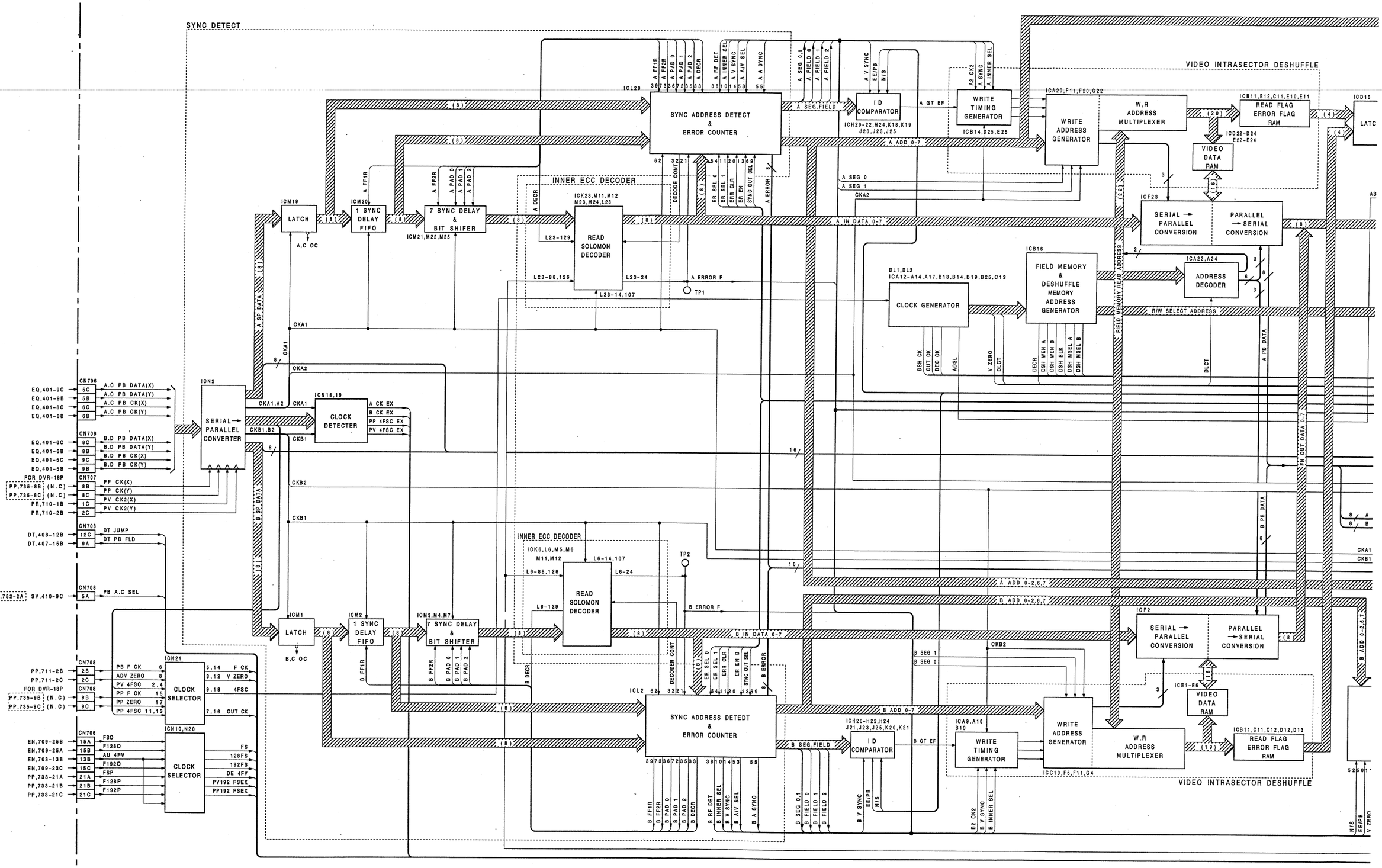

ICG5,H9,J4,J5,J6,J8,J9
K4-K6,P14,P15
ADDRESS DECODER & I/O PORT
RS422 LINE DRIVER/ RECEIVER
RS232 TRNSMITTER/ RECEIVER
16 BIT MICRO COMPUTER V25
SYSTEM ROM (65.538×8 BIT)
SYSTEM RAM (32768×8 BIT)
DIAGNOSTICS
NMI CONTROL
LATCH
LED DRIVE
FOR TEST
8 BIT DATA BUS
19 BIT ADDRESS BUS
VIDEO SIGNAL GENERATOR
ADDRESS DECODER
SELECTOR
SELECTOR & VITC VITC INSERTION
ECL → TTL TRANSLATOR
BUFF
TIMING CONTROL GENERATOR
VITC GENERATOR
16×4 BIT RAM
TIMING SELECT
BUFFERS
TRANS-CEIVERS
CPU DATA DECODER
ENCODER
SHUFFLING MEMORY
VIDEO INTER LINE SHUFFLE
VIDEO OUTER PARITY ADD
CH-A/C SECTOR ARRAY SHUFFLE
ID BIT ADD
INNER PARITY ADD
CH-A/C SYNC ADD
4FV GEN
AUDIO BIT CONV 20→8BIT
AUDIO AUX MUL TIPLEX
AUDIO OUTER PARITY ADD
CH-B/D SECTOR ARRAY SHUFFLE & DELAY
CH-B/D SYNC ADD
SHUFFLING MEMORY
AUDIO SIGNAL GENERATOR
REFERENCE FS GENERATOR
PLL LOCK DETECTER
PHASE COMP
INN AMP
VCO 18.432MHz
VCO 12.288MHz
AUDIO CLOCK GENERATOR
CLOCK DRIVER
COUNTER
CLR CLEAR
4H DELAY
CPU RD
CPU WR
EN ALE
DIAG CS
VITC,PK SYNC,PHASE
VITC,AIO MET,SW
ERS,EROUT ERIN,ERPAT,PAT
AIO CS,AP CS
CPU RD,CPU WR
AIO CS,AP CS
SYSCON,BOARD
DV EXIST H EXIST
R/W MAEQ MSTB
SEQ 0.1
PLL LOCK
0.OVF CPU IN (F0,F1,F2) (HR,VR)
REF (F0,F1,F2) (HR,VR)
ENC CS
ADV SEL
VPATO
PAT SEL
RAM CS
ROM CS
CPU RD
CPU WR
SW WR
VITC WR
VITC RD
ALE
AS
DV DATA
AV DATA
V DATA
RF AC
RF BD
AU BUS
ENC CS
CPU WR
TO/FROM AD/DE/PR/SY
AD/DE/DIF/
PP/PR/SSP
SY,413-9C
SY,413-8C
AD,701-10C/DE,707-10C/PR,710-10C/CN541,7-
AD,701-10B/DE,707-10B/PR,710-10B/CN541,7-
AD,701-10C/DE,707-10C/PR,710-10C/PP,734-
AD,701-10B/DE,707-10B/PR,710-10B/PP,734-
CN670 VIDEO PARALLEL IN (D-SUB 25P)
CN541,731-2B/AD,700-29C
CN541,731-3A/AD,700-29B
CN541,731-3B/AD,700-29A
CN541,731-4A/AD,700-30C
CN541,731-4B/AD,700-30B
CN541,731-5A/AD,700-30A
CN541,731-5B/AD,700-31C
CN541,731-6A/AD,700-31B
AD,701-4B
AD,701-4A
AD,701-5A
AD,701-5B
AD,701-5C
AD,701-6A
AD,701-4C
PR,710-7C
PR,710-8A
PR,710-8B
PR,710-8C
PR,710-7B
CN670 (D-SUB 25P)
DIF,731-9A
DIF,731-9B
CN541,731-7A
CN541,731-6B
PR,710-1C
PR,710-2C
AD,701-1C
AD,701-2C
PR,710-3A
PR,710-3B
AD,701-7C
AD,701-8A
AD,701-8B
AD,701-8C
AD,701-7B
DE,706-13C
AUF RST
PAT WR
VPATO
PAT SEL
OE
IVD F2
IVD F1
IVD F0
IVD FLD
IVD ZERO
IVD 4FSC
AV DATA 0-7
DB0-DB7
SYNC SEP
SYNC RD
CSIN
SYNC
DIO-DI3
AC-A3
D0-D3
Q0-Q3
V0-V7
SD IN
REC MODE
DELAY
RF A/C
RF B/D
B/D
A/C
4FV
ICE7
SEG0.1
WP1
RF16
RF8
SYNCA
SYNCB
REFP
X128
AFRT
ICF17,G20,G21,N21
ICE3,E4,G1,G2
ICM11,M12,N10,K13
M11-9 AU TST
AAO-AA11
AU 4FSC
AREC ZERO
AUF RST
CONF/ADV
PREE/LOCK
FS CLR
AU 4FSC
PLL LOCK
F128
FS
F384
AU3FV(N)/AU4FV(P)
F192 0
F384 I1(X)
F384 I1(Y)
F384 O1(X)
F384 O1(Y)
F384 O2(X)
F384 O2(Y)
AD,700-20A/CN541,731-1B
AD,700-20B/CN541,731-1A
AD,700-23A/DE,706-15A/CN541,731-8A
AD,700-23B/DE,706-15B/CN541,731-8B
(DE,706-13B) PP,733-15
AD,700-20A/DIF,732-1A
AD,700-20B/DIF,732-1B
AD,700-23A/DE,706-15A/PP,733-10A/DIF,732-2A
AD,700-23B/DE,706-15B/PP,733-10B/DIF,732-2B
DE,706-15C
AD,700-19C
AD,700-20C
AD,700-23C
AD,700-24C
(N.C) PP,733-10C
(N.C) PP,733-11C
PP,733-21A
PP,733-21B
AD,703-27A/DE,706-21A/CN541,731-9A
AD,703-27B/DE,706-21B/CN541,731-9B
(N.C)
(N.C)
DE,706-17A
DE,706-17B
AD,700-21A
DIF,732-1C CN541,731-2A
AD,700-25A
AD,700-25B/CN541,731-10A
AD,700-21B
AD,700-21C
CPU IN F2
CPU IN F1
CPU IN F0
CPU IN VR
CPU IN HR
REF F2
REF F1
REF F0
REF VR
REF HR
TO ICH9
HEXIST TO ICJ9
TO ICJ3

EN-99 BLOCK DIAGRAM

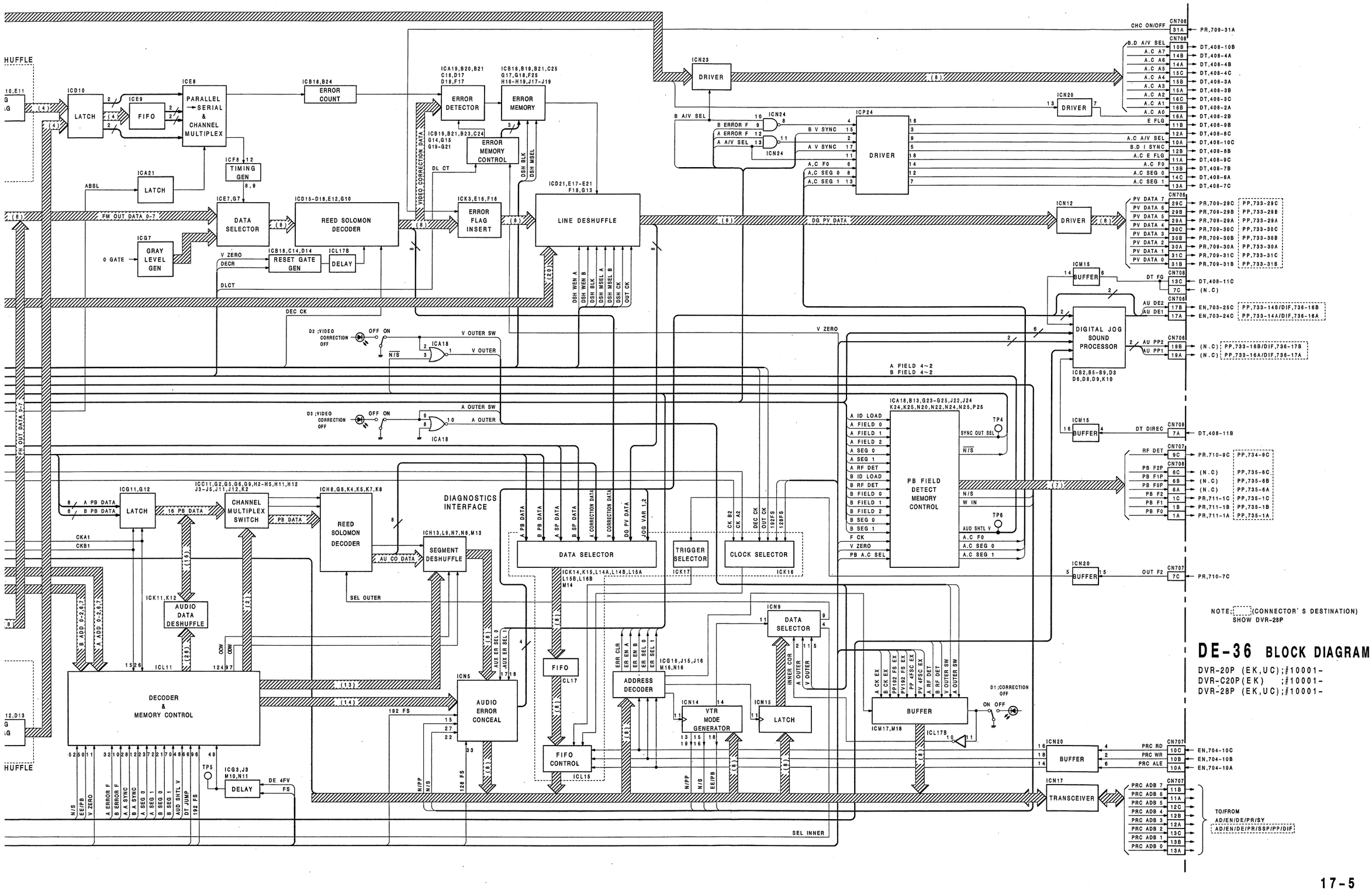


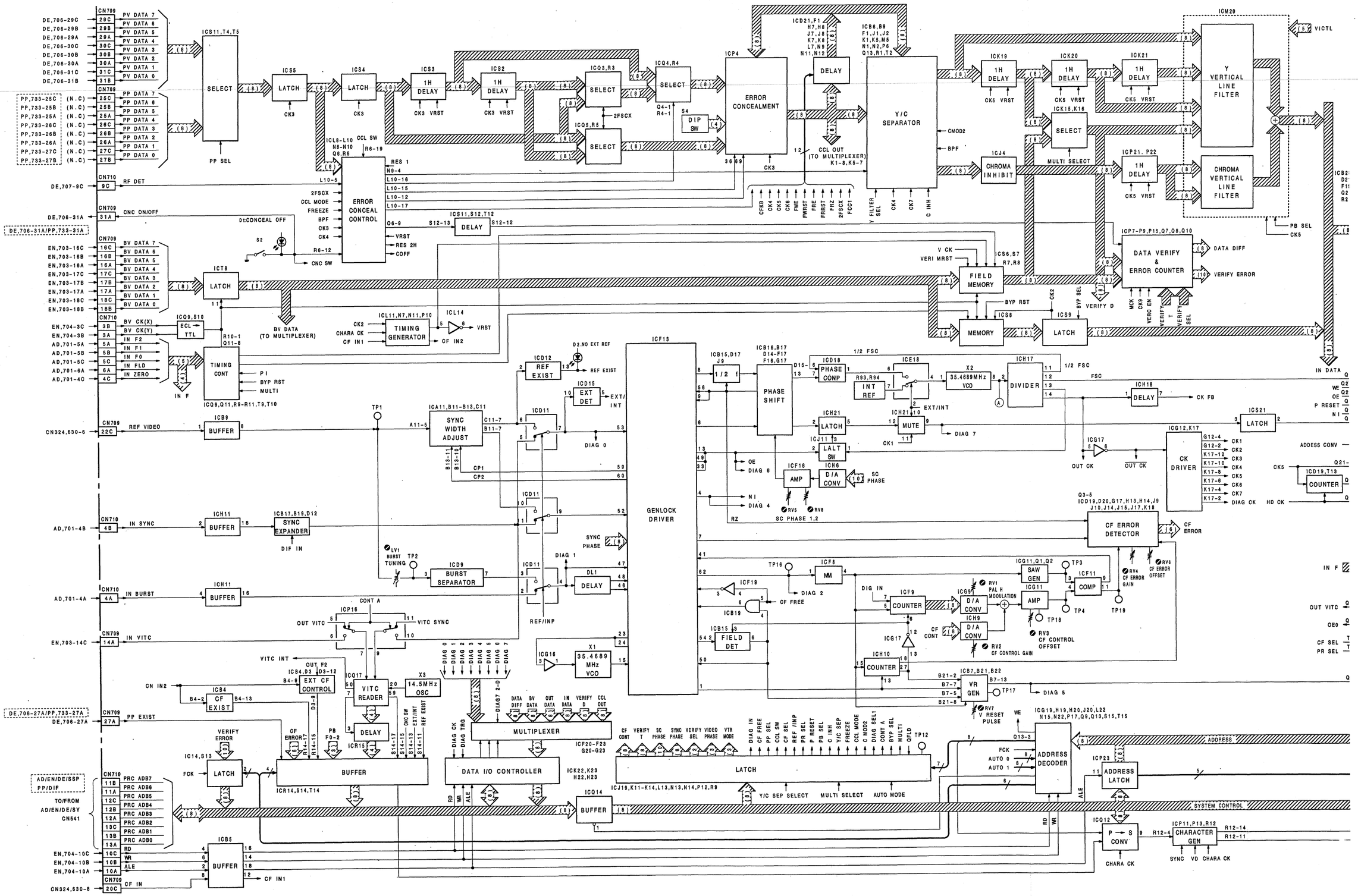
EN-99 BLOCK DIAGRAM

DVR-20 (J) ;#10001-
DVR-20 (UC) ;#10001-
DVR-C20 (J) ;#10001-
DVR-C20 (UC) ;#10001-
DVR-20P (EK,UC);#10001-
DVR-C20P(EK) ;#10001-
DVR-28 (J) ;#10001-
DVR-28 (UC) ;#10001-
DVR-28P (EK,UC);#10001-

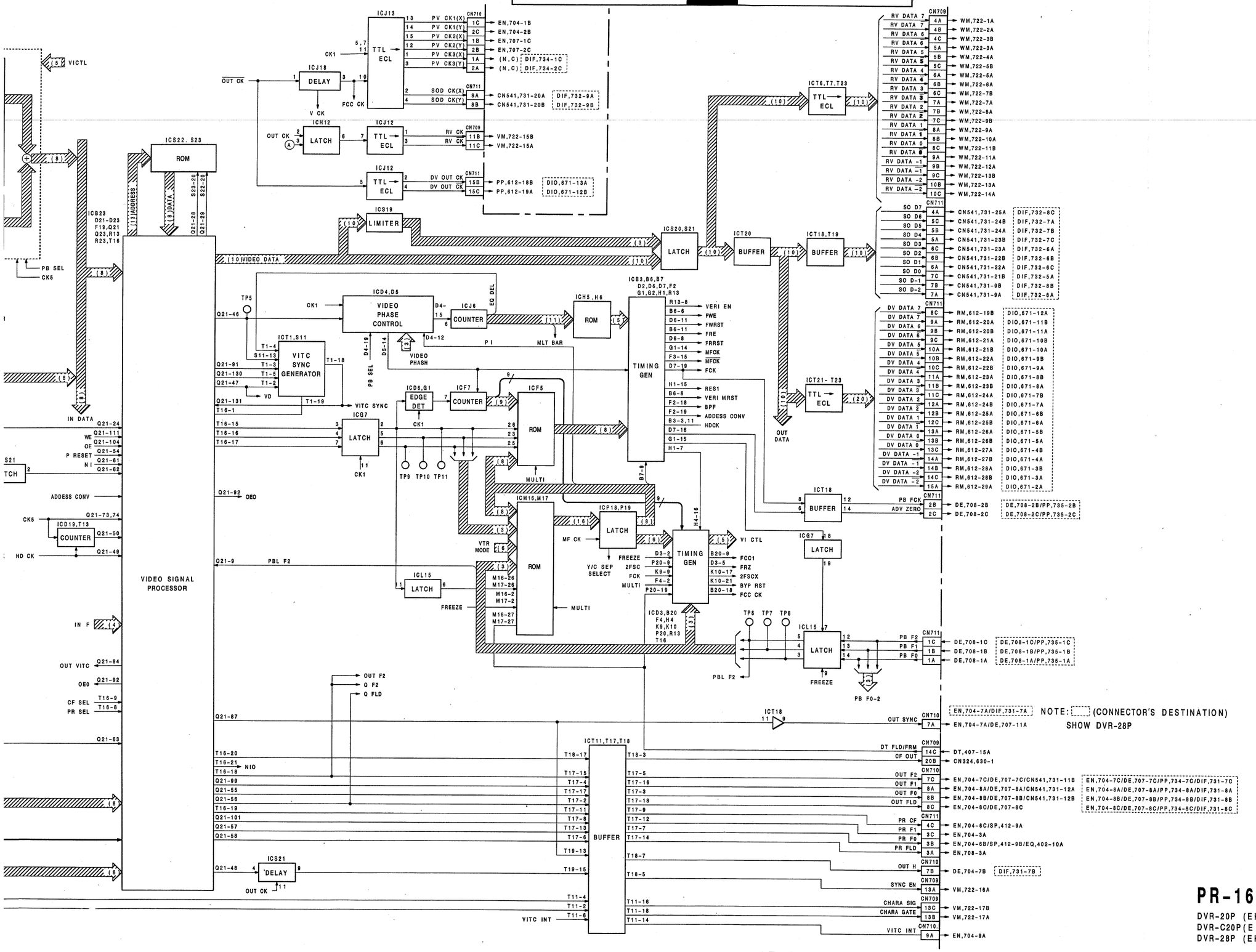

SYNC DETECT
SYNC ADDRESS DETECT & ERROR COUNTER
ID COMPARATOR
WRITE TIMING GENERATOR
WRITE ADDRESS GENERATOR
W,R ADDRESS MULTIPLEXER
READ FLAG ERROR FLAG RAM
VIDEO DATA RAM
VIDEO INTRASECTOR DESHUFFLE
INNER ECC DECODER
LATCH
1 SYNC DELAY FIFO
7 SYNC DELAY & BIT SHIFER
READ SOLOMON DECODER
SERIAL → PARALLEL CONVERSION
PARALLEL → SERIAL CONVERSION
CLOCK GENERATOR
FIELD MEMORY & DESHUFFLE MEMORY ADDRESS GENERATOR
ADDRESS DECODER
SERIAL PARALLEL CONVERTER
CLOCK DETECTER
CLOCK SELECTOR
A IN DATA 0-7
B IN DATA 0-7
A ADD 0-7
B ADD 0-2,6,7
A SP DATA
B SP DATA
A PB DATA
B PB DATA
FIELD MEMORY READ ADDRESS
R/W SELECT ADDRESS
A SEG.FIELD
B SEG.FIELD
A GT EF
B GT EF
A ERROR F
B ERROR F
TP1
TP2
ICL20
ICM19
ICM20
ICM21,M22,M25
ICK23,M11,M12 M23,M24,L23
ICH20-22,H24,K18,K19 J20,J23,J25
ICB14,D25,E25
ICA20,F11,F20,G22
ICB11,B12,C11,E10,E11
ICD22-D24 E22-E24
ICF23
ICB16
DL1,DL2 ICA12-A14,A17,B13,B14,B19,B25,C13
ICA22,A24
ICN2
ICN18,19
ICN21
ICN10,N20
ICK6,L6,M5,M6 M11,M12
ICM1
ICM2
ICM3,M4,M7
ICL2
ICH20-H22,H24 J21,J23,J25,K20,K21
ICA9,A10 B10
ICE1-E6
ICC10,F5,F11,G4
ICB11,C11,C12,D12,D13
CN706
CN707
CN708
EQ,401-9C
EQ,401-9B
EQ,401-8C
EQ,401-8B
EQ,401-6C
EQ,401-6B
EQ,401-5C
EQ,401-5B
FOR DVR-18P
PP,735-8B (N.C)
PP,735-8C (N.C)
PR,710-1B
PR,710-2B
DT,408-12B
DT,407-15B
SSP,752-2A
SV,410-9C
PP,711-2B
PP,711-2C
PP,735-9B (N.C)
PP,735-9C (N.C)
EN,709-25B
EN,709-25A
EN,703-13B
EN,703-23C
PP,733-21A
PP,733-21B
PP,733-21C
A.C PB DATA(X)
A.C PB DATA(Y)
A.C PB CK(X)
A.C PB CK(Y)
B.D PB DATA(X)
B.D PB DATA(Y)
B.D PB CK(X)
B.D PB CK(Y)
PP CK(X)
PP CK(Y)
PV CK2(X)
PV CK2(Y)
DT JUMP
DT PB FLD
PB A.C SEL
PB F CK
ADV ZERO
PV 4FSC
PP F CK
PP ZERO
PP 4FSC
FSO
F128O
AU 4FV
F192O
FSP
F128P
F192P
A CK EX
B CK EX
PP 4FSC EX
PV 4FSC EX
F CK
V ZERO
4FSC
OUT CK
128FS
192FS
DE 4FV
PV192 FSEX
PP192 FSEX
A,C OC
B,C OC
CKA1
CKA2
CKB1
CKB2
CKA1,A2
CKB1,B2
L23-129
L23-88,126
L23-24
L23-14,107
L6-129
L6-88,126
L6-24
L6-14,107
DECODE CONT
ER SEL 0
ER SEL 1
ERR CLR
ER EN
SYNC OUT SEL
A ERROR
B ERROR
A DECR
B DECR
A FF1R
A FF2R
A PAD 0
A PAD 1
A PAD 2
B FF1R
B FF2R
B PAD 0
B PAD 1
B PAD 2
A RF DET
A INNER SEL
A V SYNC
A A/V SEL
A A SYNC
B RF DET
B INNER SEL
B V SYNC
B A/V SEL
B A SYNC
A SEG 0,1
A FIELD 0
A FIELD 1
A FIELD 2
B SEG 0,1
B FIELD 0
B FIELD 1
B FIELD 2
A V SYNC
EE/P/B
N/S
A SEG 0
A SEG 1
B SEG 1
B SEG 0
A2 CK2
A SYNC
A INNER SEL
B2 CK2
B V SYNC
B INNER SEL
DSH CK
OUT CK
DEC CK
ADSL
V ZERO
DLCT
DECR
DSH WEN A
DSH WEN B
DSH BLK
DSH MSEL A
DSH MSEL B
FH OUT DATA 0-7
V ZERO
A
B

DE-36 BLOCK DIAGRAM



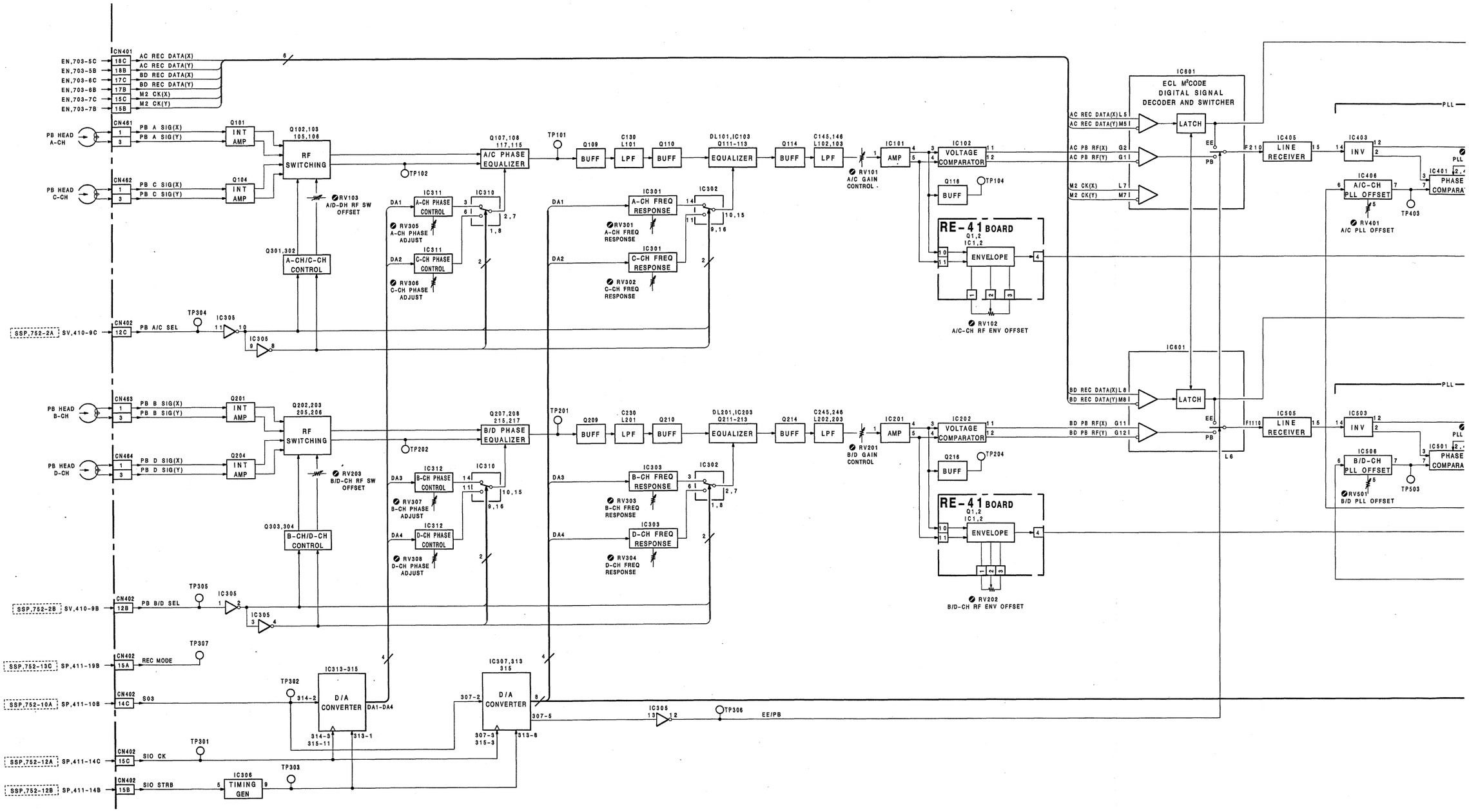

CN709
PV DATA 7
PV DATA 6
PV DATA 5
PV DATA 4
PV DATA 3
PV DATA 2
PV DATA 1
PV DATA 0
PP DATA 7
PP DATA 6
PP DATA 5
PP DATA 4
PP DATA 3
PP DATA 2
PP DATA 1
PP DATA 0
SELECT
PP SEL
LATCH
CK3
1H DELAY
CK3 VRST
ICQ3,R3
ICQ5,R5
2FSCX
ICQ4,R4
Q4-1
R4-1
S4
DIP SW
ICP4
ERROR CONCEALMENT
ICD21,F1 H7,H8 J7,J8 K7,K8 L7,N9 N11,N12
ICB6,B9 F1,J1,J2 K1,K5,M5 N1,N2,P6 Q13,R1,T2
DELAY
CCL OUT (TO MULTIPLEXER) K1-8,K5-7
Y/C SEPARATOR
CMOD2
BPF
ICK19
ICK20
ICK21
ICM20
Y VERTICAL LINE FILTER
VICTL
ICK15,K16
MULTI SELECT
ICJ4
CHROMA INHIBIT
ICP21. P22
CHROMA VERTICAL LINE FILTER
PB SEL
CK5
ICB2:
D2
F11
Q2
R2
CN710
RF DET
DE,707-9C
CNC ON/OFF
DE,706-31A
DE,706-31A/PP,733-31A
DtCONCEAL OFF
S2
CNC SW
ERROR CONCEAL CONTROL
ICL8-L10 N8-N10 Q5,R6
CCL SW
R6-19
RES 1
N9-4
L10-16
L10-15
L10-12
L10-17
2FSCX
CCL MODE
FREEZE
BPF
CK3
CK4
VRST
RES 2H
COFF
R6-12
Q6-9
S12-13
ICS11,S12,T12
DELAY
S12-12
CRKB
CK4
CK5
CK6
FWE
FWRST
FRE
FRRST
FRZ
2FSCX
FCC1
Y FILTER SEL
CK4
CK7
C INH
CN709
BV DATA 7
BV DATA 6
BV DATA 5
BV DATA 4
BV DATA 3
BV DATA 2
BV DATA 1
BV DATA 0
ICT8
LATCH
BV DATA (TO MULTIPLEXER)
V CK
VERI MRST
ICS6,S7
R7,R8
FIELD MEMORY
BYP RST
CK2
ICS8
MEMORY
ICS9
LATCH
BYP SEL
VERIFY D
ICP7-P9,P15,Q7,Q8,Q10
DATA VERIFY & ERROR COUNTER
DATA DIFF
VERIFY ERROR
MCK
CK9
VERC EN
VERIFY T
VERIFY SEL
CN710
BV CK(X)
BV CK(Y)
IN F2
IN F1
IN F0
IN FLD
IN ZERO
ICQ9,S10
ECL TTL
R10-1
Q11-8
TIMING CONT
P I
BYP RST
MULTI
ICQ9,Q11,R9-R11,T9,T10
IN F
ICL11,N7,N11,P10
TIMING GENERATOR
CK2
CHARA CK
CF IN1
ICL14
VRST
CF IN2
CN709
REF VIDEO
22C
CN324,630-6
ICB9
BUFFER
TP1
ICA11,B11-B13,C11
SYNC WIDTH ADJUST
A11-5
B11-7
C11-7
B13-11
B13-10
CP1
CP2
ICD11
ICD12
REF EXIST
D2:NO EXT REF
ICD15
EXT DET
EXT/INT
DIAG 0
ICF13
GENLOCK DRIVER
ICB15,D17 J9
1/2
ICB16,B17 D14-F17 F16,G17
PHASE SHIFT
ICD18
PHASE CONP
1/2 FSC
ICE18
R93,R94
INT REF
X2
35.4689MHz VCO
ICH17
DIVIDER
FSC
ICH18
DELAY
CK FB
EXT/INT
ICH21
LATCH
MUTE
DIAG 7
CK1
ICJ11
LALT SW
OE
DIAG 6
ICF16
AMP
ICH6
D/A CONV
SC PHASE
RV5
RV8
SC PHASE 1,2
N1
DIAG 4
RZ
ICS21
LATCH
IN DATA
WE
OE
P RESET
N1
ICG17
OUT CK
ICG12,K17
CK DRIVER
ADDESS CONV
CK5
ICD19,T13
COUNTER
HD CK
Q3-5
ICD19,D20,G17,H13,H14,J9 J10,J14,J15,J17,K18
CF ERROR DETECTOR
CF ERROR
RV4 CF ERROR GAIN
RV6 CF ERROR OFFSET
CN710
REF VIDEO
IN SYNC
IN BURST
IN VITC
ICH11
BUFFER
ICB17,B19,D12
SYNC EXPANDER
DIF IN
LV1 BURST TUNING
TP2
ICD9
BURST SEPARATOR
DIAG 1
DL1
DELAY
SYNC PHASE
REF/INP
CONT A
ICP16
OUT VITC
VITC SYNC
VITC INT
OUT F2
ICB4,D3 D3-12
EXT CF CONTROL
CN IN2
ICB4
CF EXIST
B4-2
B4-13
D3-9
ICQ17
VITC READER
X3
14.5MHz OSC
ICG16
X1
35.4689 MHz VCO
DIAG 0
DIAG 1
DIAG 2
DIAG 3
DIAG 4
DIAG 5
DIAG 6
DIAG 7
DE,706-27A/PP,733-27A
DE,706-27A
PP EXIST
CN709
27A
VERIFY ERROR
IC14,S13
FCK
LATCH
CF ERROR
PB F0-2
ICR15
DELAY
S14-17
S14-15
S14-13
S14-11
CHC SW
EXT/INT
REF EXIST
BUFFER
ICR14,S14,T14
MULTIPLEXER
DATA I/O CONTROLLER
ICK22,K23 H22,H23
ICF20-F23 G20-G23
DIAG CK
DIAG TRG
RD
WR
ALE
DATA DIFF
BV DATA
OUT DATA
IN DATA
VERIFY D
CCL OUT
CF CONT
VERIFY T
SC PHASE
SYNC PHASE
VERIFY SEL
VIDEO PHASE
VTR MODE
DIAG IN
CF FREE
PP SEL
CCL SW
CF SEL
REF /INP
PR SEL
P RESET
PB SEL
C INH
Y/C SEP
FREEZE
CCL MODE
C MOD2
DIAG SEL1
CONT A
BYP SEL
MULTI
QFLD
TP12
LATCH
ICJ19,K11-K14,L13,N13,N14,P12,R9
Y/C SEP SELECT
MULTI SELECT
AUTO MODE
ICG14
BUFFER
ICG19,H19,H20,J20,L22 N15,N22,P17,Q9,Q13,S15,T15
ADDRESS DECODER
FCK
AUTO 0
AUTO 1
ADDRESS
ICP23
ADDRESS LATCH
SYSTEM CONTROL
ICQ12
P → S CONV
CHARA CK
ICP11,P13,R12
CHARACTER GEN
SYNC
VD
CHARA CK
R12-4
R12-14
R12-11
AD/EN/DE/SSP PP/DIF
TO/FROM AD/EN/DE/SY CN541
CN710
PRC ADB7
PRC ADB6
PRC ADB5
PRC ADB4
PRC ADB3
PRC ADB2
PRC ADB1
PRC ADB0
RD
WR
ALE
CF IN
ICB5
BUFFER
CF IN1
CN324,630-8
ICD10
SAW GEN
TP3
ICF11
COMP
TP4
TP19
ICG11,Q1,Q2
ICG11
AMP
TP18
RV1 PAL H MODULATION
RV3 CF CONTROL OFFSET
RV2 CF CONTROL GAIN
ICG9
D/A CONV
ICH9
D/A CONV
ICG17
CF CONT
ICH10
COUNTER
ICF9
COUNTER
DIG IN
ICB19
ICF19
CF FREE
TP16
ICF8
MM
DIAG 2
ICB15
FIELD DET
ICB7,B21,B22
VR GEN
TP17
DIAG 5
RV7 V RESET PULSE
IN F
OUT VITC
OE0
CF SEL
PR SEL

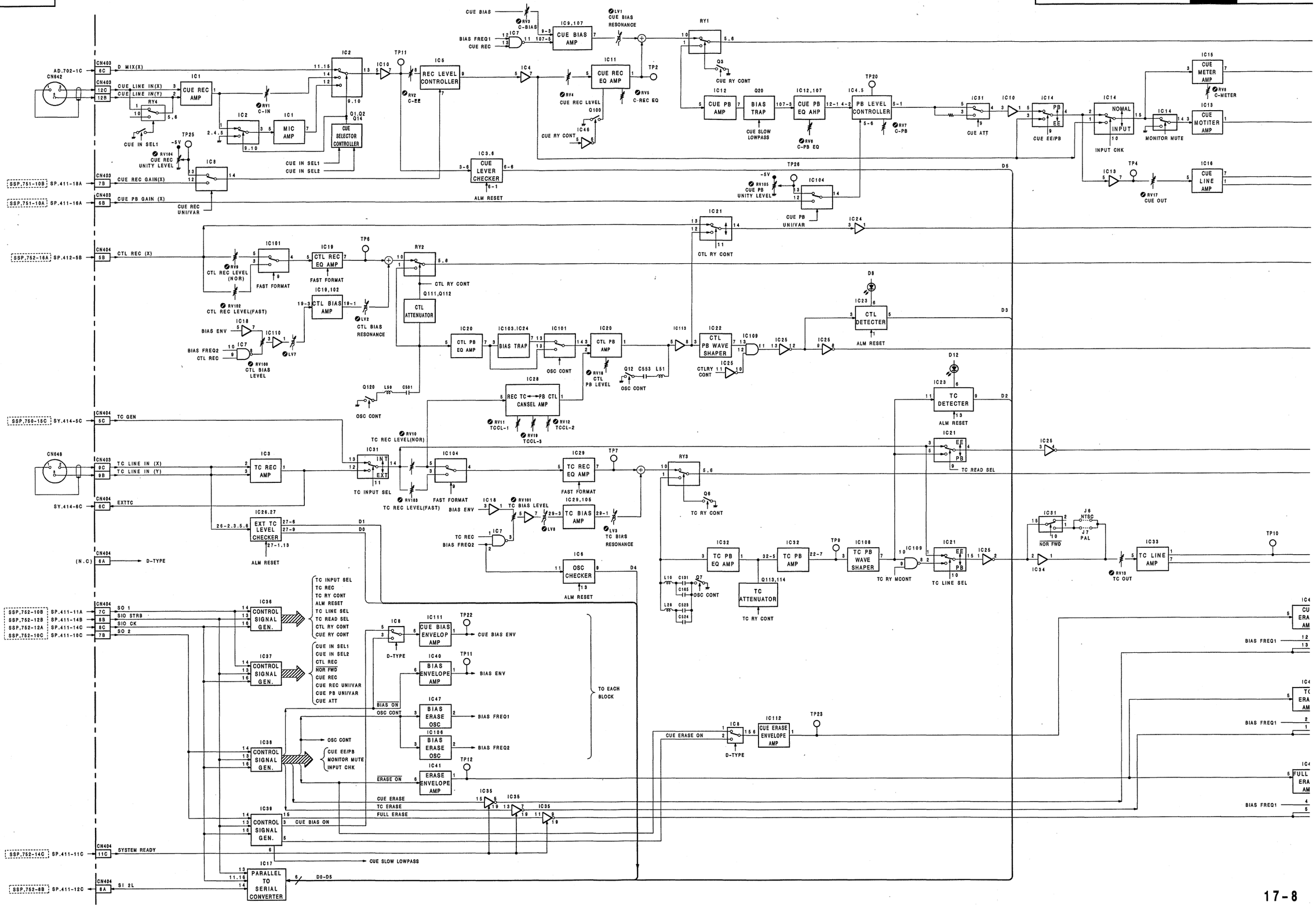
PR-163 BLOCK DIAGRAM

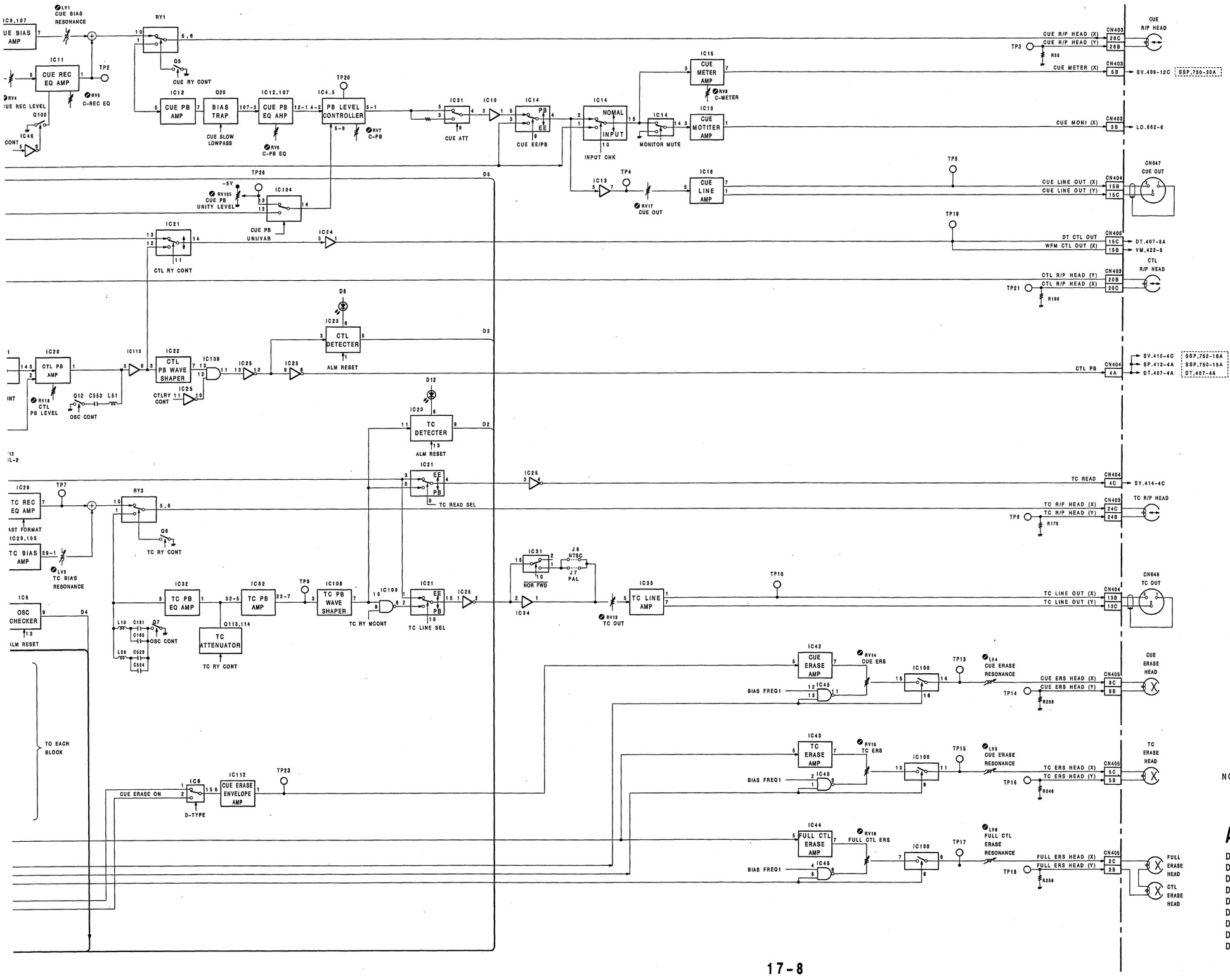


PR-163 BLOCK DIAGRAM

DVR-20P (EK,UC);#10001-
DVR-C20P(EK) ;#10001-
DVR-28P (EK,UC);#10001-


CN401
18C AC REC DATA(X)
18B AC REC DATA(Y)
17C BD REC DATA(X)
17B BD REC DATA(Y)
15C M2 CK(X)
15B M2 CK(Y)
EN,703-5C
EN,703-5B
EN,703-6C
EN,703-6B
EN,703-7C
EN,703-7B
PB HEAD A-CH
PB HEAD C-CH
PB HEAD B-CH
PB HEAD D-CH
CN461 PB A SIG(X) PB A SIG(Y)
CN462 PB C SIG(X) PB C SIG(Y)
CN463 PB B SIG(X) PB B SIG(Y)
CN464 PB D SIG(X) PB D SIG(Y)
Q101 INT AMP
Q104 INT AMP
Q201 INT AMP
Q204 INT AMP
Q102,103 105,106 RF SWITCHING
Q202,203 205,206 RF SWITCHING
Q301,302 A-CH/C-CH CONTROL
Q303,304 B-CH/D-CH CONTROL
RV103 A/D-DH RF SW OFFSET
RV203 B/D-CH RF SW OFFSET
TP102
TP202
Q107,108 117,115 A/C PHASE EQUALIZER
Q207,208 215,217 B/D PHASE EQUALIZER
IC311 A-CH PHASE CONTROL
IC311 C-CH PHASE CONTROL
IC312 B-CH PHASE CONTROL
IC312 D-CH PHASE CONTROL
RV305 A-CH PHASE ADJUST
RV306 C-CH PHASE ADJUST
RV307 B-CH PHASE ADJUST
RV308 D-CH PHASE ADJUST
IC310
DA1
DA2
DA3
DA4
TP101
TP201
Q109 BUFF
Q209 BUFF
C130 L101 LPF
C230 L201 LPF
Q110 BUFF
Q210 BUFF
DL101,IC103 Q111-113 EQUALIZER
DL201,IC203 Q211-213 EQUALIZER
Q114 BUFF
Q214 BUFF
C145,146 L102,103 LPF
C245,246 L202,203 LPF
IC301 A-CH FREQ RESPONSE
IC301 C-CH FREQ RESPONSE
IC303 B-CH FREQ RESPONSE
IC303 D-CH FREQ RESPONSE
IC302
RV301 A-CH FREQ RESPONSE
RV302 C-CH FREQ RESPONSE
RV303 B-CH FREQ RESPONSE
RV304 D-CH FREQ RESPONSE
RV101 A/C GAIN CONTROL
RV201 B/D GAIN CONTROL
IC101 AMP
IC201 AMP
IC102 VOLTAGE COMPARATOR
IC202 VOLTAGE COMPARATOR
Q116 BUFF
Q216 BUFF
TP104
TP204
RE-41 BOARD Q1,2 IC1,2 ENVELOPE
RV102 A/C-CH RF ENV OFFSET
RV202 B/D-CH RF ENV OFFSET
IC601 ECL M²CODE DIGITAL SIGNAL DECODER AND SWITCHER
AC REC DATA(X) L5
AC REC DATA(Y) M5
AC PB RF(X) G2
AC PB RF(Y) G1
M2 CK(X) L7
M2 CK(Y) M7
BD REC DATA(X) L8
BD REC DATA(Y) M8
BD PB RF(X) G11
BD PB RF(Y) G12
LATCH
EE
PB
IC405 LINE RECEIVER
IC505 LINE RECEIVER
IC403 INV
IC503 INV
IC406 A/C-CH PLL OFFSET
IC506 B/D-CH PLL OFFSET
RV401 A/C PLL OFFSET
RV501 B/D PLL OFFSET
TP403
TP503
PLL
IC401 PHASE COMPARA
IC501 PHASE COMPARA
SSP,752-2A SV,410-9C
SSP,752-2B SV,410-9B
SSP,752-13C SP,411-19B
SSP,752-10A SP,411-10B
SSP,752-12A SP,411-14C
SSP,752-12B SP,411-14B
CN402 12C PB A/C SEL
CN402 12B PB B/D SEL
CN402 15A REC MODE
CN402 14C SO3
CN402 15C SIO CK
CN402 15B SIO STRB
IC305
TP304
TP305
TP307
TP301
TP303
IC313-315 D/A CONVERTER
IC307,313 315 D/A CONVERTER
TP302
IC306 TIMING GEN
TP306
EE/PB

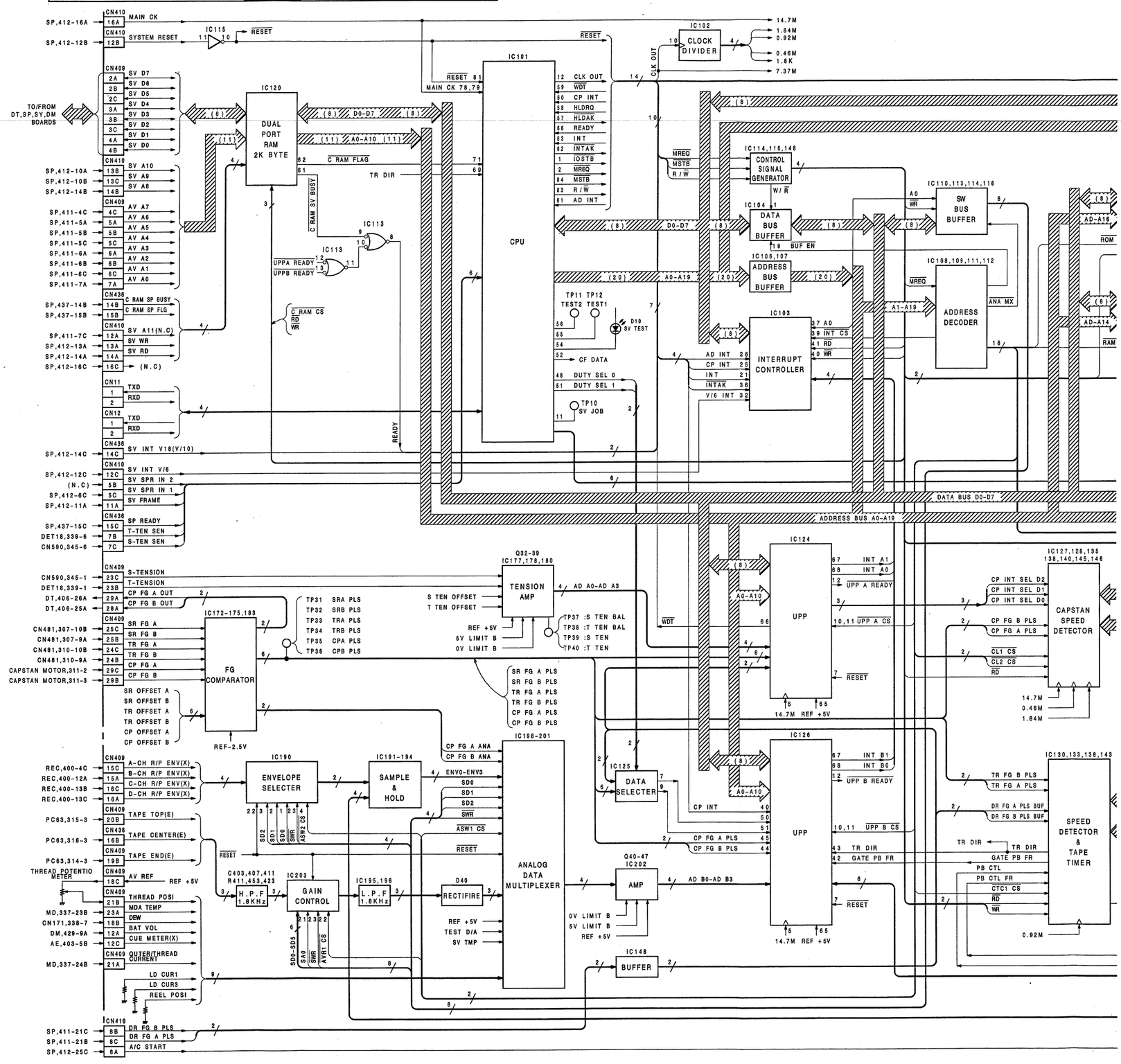

CUE BIAS
RV3 C-BIAS
IC9,107
CUE BIAS AMP
LV1 CUE BIAS RESONANCE
BIAS FREQ1
CUE REC
IC7
RY1
AD.702-1C
CN642
CN403 6C D MIX(X)
CN403 12C CUE LINE IN(X)
CN403 12B CUE LINE IN(Y)
IC1 CUE REC AMP
RV1 C-IN
IC2
TP11
IC10
IC5 REC LEVEL CONTROLLER
RV2 C-EE
IC4
IC11 CUE REC EQ AMP
TP2
RV4 CUE REC LEVEL
RV5 C-REC EQ
Q100
IC46
CUE RY CONT
Q3 CUE RY CONT
IC12 CUE PB AMP
Q20 BIAS TRAP
CUE SLOW LOWPASS
IC12,107 CUE PB EQ AHP
RV6 C-PB EQ
IC4.5 PB LEVEL CONTROLLER
TP20
RV7 C-PB
IC31 CUE ATT
IC14 PB EE
CUE EE/PB
IC14 NOMAL INPUT
INPUT CHK
IC14
MONITOR MUTE
IC15 CUE METER AMP
RV8 C-METER
IC13 CUE MOTITER AMP
IC16 CUE LINE AMP
TP4
RV17 CUE OUT
IC13
CUE IN SEL1
CUE IN SEL2
IC1 MIC AMP
CUE SELECTOR CONTROLLER
Q1,Q2 Q14
TP25 -5V
RV104 CUE REC UNITY LEVEL
IC8
CUE REC UNI/VAR
IC3.6 CUE LEVER CHECKER
ALM RESET
TP26 -5V
RV105 CUE PB UNITY LEVEL
IC104
CUE PB UNI/VAR
D5
SSP.751-10B SP.411-18A
CN403 7B CUE REC GAIN(X)
SSP.751-10A SP.411-16A
CN403 6B CUE PB GAIN (X)
IC21
CTL RY CONT
IC24
SSP.752-16A SP.412-5B
CN404 5B CTL REC (X)
IC101
RV9 CTL REC LEVEL (NOR)
FAST FORMAT
IC19 CTL REC EQ AMP
TP6
RY2
RV102 CTL REC LEVEL(FAST)
IC19,102 CTL BIAS AMP
LV2 CTL BIAS RESONANCE
CTL RY CONT
Q111,Q112
CTL ATTENUATOR
IC18 BIAS ENV
IC110
LV7
BIAS FREQ2
CTL REC
IC7
RV100 CTL BIAS LEVEL
IC20 CTL PB EQ AMP
IC103.IC24 BIAS TRAP
IC101
OSC CONT
IC20 CTL PB AMP
RV18 CTL PB LEVEL
Q12 C553 L51
OSC CONT
IC113
IC22 CTL PB WAVE SHAPER
IC109
IC25
CTLRY CONT
D8
IC23 CTL DETECTER
ALM RESET
D3
Q120 L50 C501
OSC CONT
IC28 REC TC⟷PB CTL CANSEL AMP
RV11 TCCL-1
RV12 TCCL-2
RV19 TCCL-3
D12
IC23 TC DETECTER
ALM RESET
D2
SSP.750-15C SY.414-5C
CN404 5C TC GEN
IC21 EE PB
TC READ SEL
CN648
CN403 9C TC LINE IN (X)
CN403 9B TC LINE IN (Y)
IC3 TC REC AMP
IC31 INT EXT
TC INPUT SEL
RV10 TC REC LEVEL(NOR)
IC104
RV103 TC REC LEVEL(FAST)
FAST FORMAT
IC29 TC REC EQ AMP
TP7
RY3
Q6 TC RY CONT
SY.414-6C
CN404 6C EXTTC
IC26.27 EXT TC LEVEL CHECKER
ALM RESET
IC18 BIAS ENV
RV101 TC BIAS LEVEL
IC29,105 TC BIAS AMP
LV3 TC BIAS RESONANCE
TC REC BIAS FREQ2
IC7
IC6 OSC CHECKER
ALM RESET
D1
D0
D4
IC32 TC PB EQ AMP
IC32 TC PB AMP
TP9
IC108 TC PB WAVE SHAPER
TC RY MCONT
IC109
IC21 EE PB
TC LINE SEL
IC25
IC31 NOR FWD
J8 NTSC
J7 PAL
IC34
IC33 TC LINE AMP
RV13 TC OUT
TP10
L10 C551 Q7 C545 OSC CONT
L28 C523 C524
Q113,114 TC ATTENUATOR
TC RY CONT
(N.C)
CN404 8A D-TYPE
SSP.752-10B SP.411-11A
SSP.752-12B SP.411-14B
SSP.752-12A SP.411-14C
SSP.752-10C SP.411-10C
CN404 7C SO 1
CN404 8B SIO STRB
CN404 8C SIO CK
CN404 7B SO 2
IC36 CONTROL SIGNAL GEN.
TC INPUT SEL
TC REC
TC RY CONT
ALM RESET
TC LINE SEL
TC READ SEL
CTL RY CONT
CUE RY CONT
IC37 CONTROL SIGNAL GEN.
CUE IN SEL1
CUE IN SEL2
CTL REC
NOR FWD
CUE REC
CUE REC UNI/VAR
CUE PB UNI/VAR
CUE ATT
TO EACH BLOCK
IC8 D-TYPE
IC111 CUE BIAS ENVELOP AMP
TP22
CUE BIAS ENV
IC40 BIAS ENVELOPE AMP
TP11
BIAS ENV
BIAS ON
OSC CONT
IC47 BIAS ERASE OSC
BIAS FREQ1
IC106 BIAS ERASE OSC
BIAS FREQ2
IC38 CONTROL SIGNAL GEN.
OSC CONT
CUE EE/PB
MONITOR MUTE
INPUT CHK
IC41 ERASE ENVELOPE AMP
TP12
ERASE ON
CUE ERASE
TC ERASE
FULL ERASE
IC35
IC39 CONTROL SIGNAL GEN.
CUE BIAS ON
CUE SLOW LOWPASS
SSP.752-14C SP.411-11C
CN404 11C SYSTEM READY
IC17 PARALLEL TO SERIAL CONVERTER
D0-D5
SSP.752-8B SP.411-12C
CN404 8A SI 2L
CUE ERASE ON
IC8 D-TYPE
IC112 CUE ERASE ENVELOPE AMP
TP23

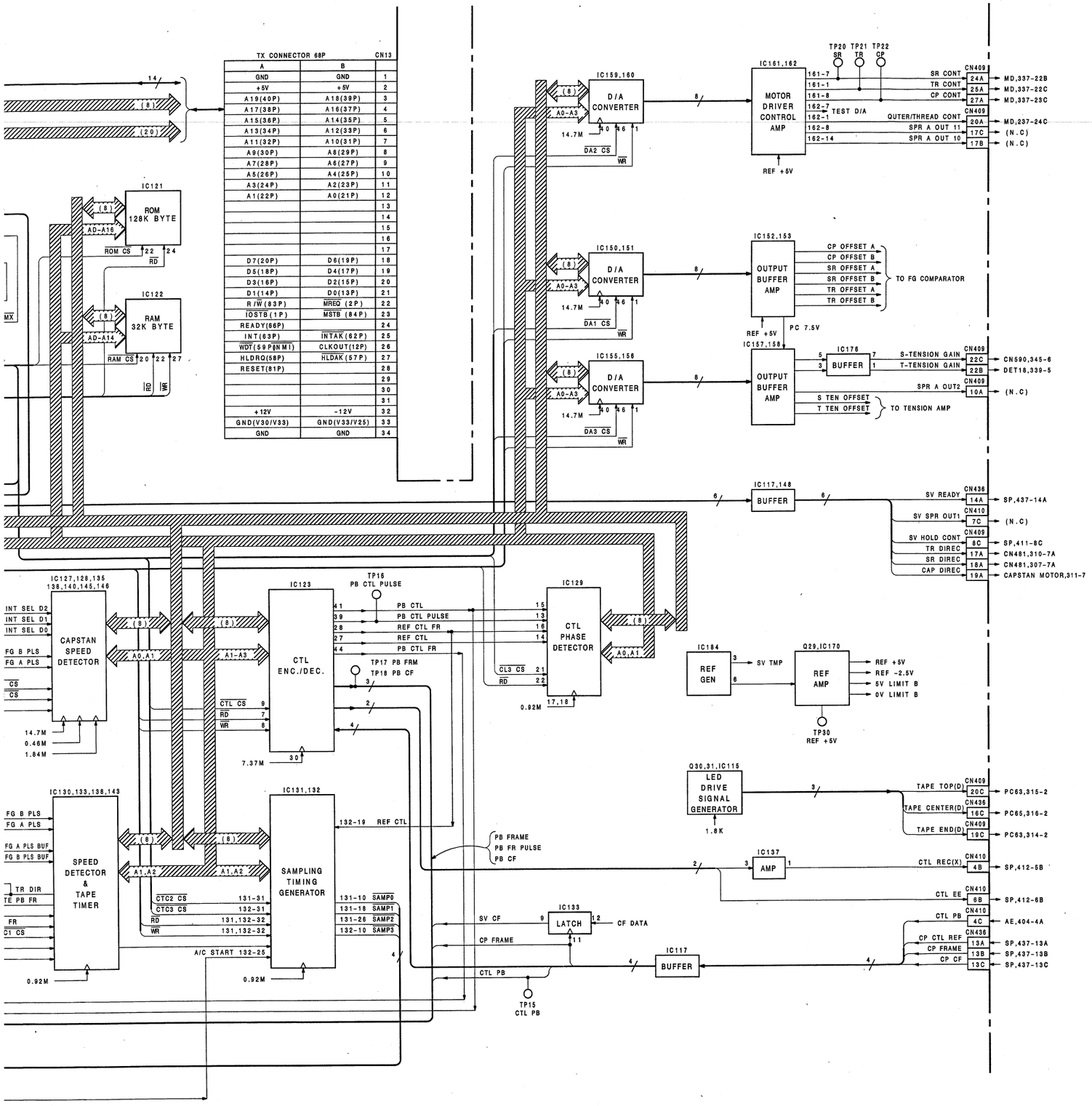


NOTE: [ ] (CONNECTOR'S DESTINATION)
SHOW DVR-28/28P

AE-15 BLOCK DIAGRAM

DVR-20 (J) ;#10001-
DVR-20 (UC) ;#10001-
DVR-C20 (J) ;#10001-
DVR-C20 (UC) ;#10001-
DVR-20P (EK,UC);#10001-
DVR-C20P(EK) ;#10001-
DVR-28 (J) ;#10001-
DVR-28 (UC) ;#10001-
DVR-28P (EK,UC);#10001-

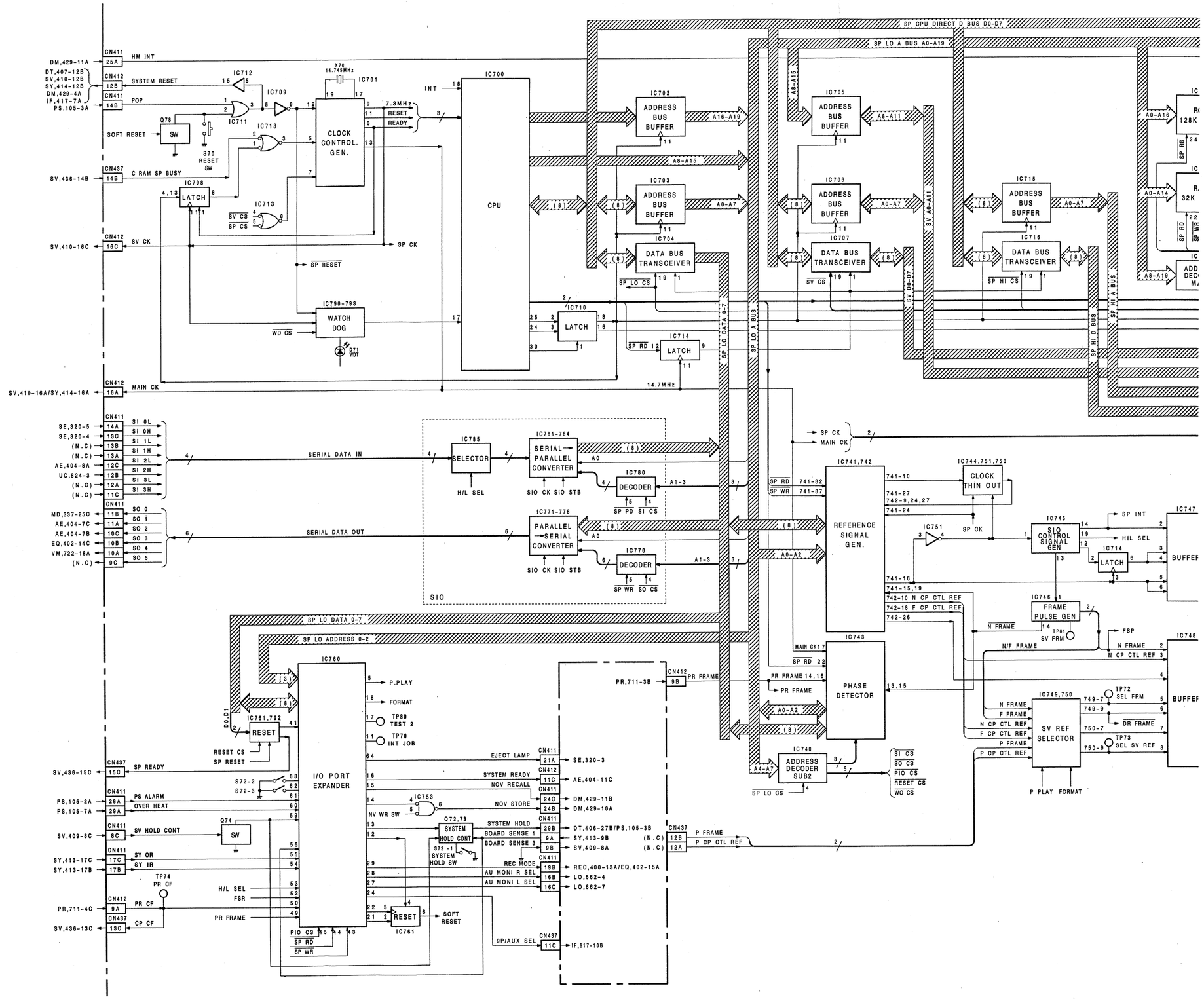

CN410 16A MAIN CK
CN410 12B SYSTEM RESET
IC115
RESET
CN409 SV D7 SV D6 SV D5 SV D4 SV D3 SV D2 SV D1 SV D0
TO/FROM DT,SP,SY,DM BOARDS
IC120
DUAL PORT RAM 2K BYTE
D0-D7
A0-A10
C RAM FLAG
TR DIR
C RAM SV BUSY
C RAM CS
RD
WR
IC113
UPPA READY
UPPB READY
READY
CN410 SV A10 SV A9 SV A8
CN409 AV A7 AV A6 AV A5 AV A4 AV A3 AV A2 AV A1 AV A0
CN436 C RAM SP BUSY C RAM SP FLG
CN410 SV A11(N.C) SV WR SV RD (N.C)
CN11 TXD RXD
CN12 TXD RXD
CN436 SV INT V18(V/10)
CN410 SV INT V/6 SV SPR IN 2 SV SPR IN 1 SV FRAME
CN436 SP READY T-TEN SEN S-TEN SEN
CN409 S-TENSION T-TENSION CP FG A OUT CP FG B OUT
CN409 SR FG A SR FG B TR FG A TR FG B CP FG A CP FG B
IC172-175,183
FG COMPARATOR
REF-2.5V
SR OFFSET A SR OFFSET B TR OFFSET A TR OFFSET B CP OFFSET A CP OFFSET B
TP31 SRA PLS
TP32 SRB PLS
TP33 TRA PLS
TP34 TRB PLS
TP35 CPA PLS
TP36 CPB PLS
IC101
CPU
RESET
MAIN CK 78,79
IC102
CLOCK DIVIDER
CLK OUT
14.7M
1.84M
0.92M
0.46M
1.8K
7.37M
MREQ MSTB R/W WDT
IC114,116,148
CONTROL SIGNAL GENERATOR
W/R
IC104
DATA BUS BUFFER
BUF EN
IC106,107
ADDRESS BUS BUFFER
A0-A19
IC110,113,114,116
SW BUS BUFFER
IC108,109,111,112
ADDRESS DECODER
A1-A19
ANA MX
ROM
RAM
AD-A16
AD-A14
IC103
INTERRUPT CONTROLLER
AD INT
CP INT
INT
INTAK
V/6 INT
TP11 TP12 TEST2 TEST1
D10 SV TEST
CF DATA
DUTY SEL 0
DUTY SEL 1
TP10 SV JOB
DATA BUS D0-D7
ADDRESS BUS A0-A19
IC124
UPP
UPP A READY
UPP A CS
IC126
UPP
UPP B READY
UPP B CS
RESET
14.7M REF +5V
IC127,128,135 138,140,145,146
CAPSTAN SPEED DETECTOR
CP INT SEL D2
CP INT SEL D1
CP INT SEL D0
CP FG B PLS
CP FG A PLS
CL1 CS
CL2 CS
RD
IC130,133,138,143
SPEED DETECTOR & TAPE TIMER
TR FG B PLS
TR FG A PLS
DR FG A PLS BUF
DR FG B PLS BUF
TR DIR
GATE PB FR
PB CTL
PB CTL FR
CTC1 CS
WR
0.92M
Q32-39 IC177,178,180
TENSION AMP
AD A0-AD A3
S TEN OFFSET
T TEN OFFSET
REF +5V
5V LIMIT B
0V LIMIT B
TP37 :S TEN BAL
TP38 :T TEN BAL
TP39 :S TEN
TP40 :T TEN
SR FG A PLS SR FG B PLS TR FG A PLS TR FG B PLS CP FG A PLS CP FG B PLS
IC198-201
ANALOG DATA MULTIPLEXER
CP FG A ANA
CP FG B ANA
ENV0-ENV3
SD0 SD1 SD2 SWR
ASW1 CS
RESET
D40
RECTIFIRE
TEST D/A
5V TMP
IC125
DATA SELECTER
Q40-47 IC202
AMP
AD B0-AD B3
IC148
BUFFER
IC190
ENVELOPE SELECTER
IC191-194
SAMPLE & HOLD
IC195,196
L.P.F 1.8KHz
IC203
GAIN CONTROL
C403,407,411 R411,453,423
H.P.F 1.8KHz
SD0-SD5 SA0 SWR AVR1 CS
A-CH R/P ENV(X) B-CH R/P ENV(X) C-CH R/P ENV(X) D-CH R/P ENV(X)
TAPE TOP(E) TAPE CENTER(E) TAPE END(E)
AV REF REF +5V
THREAD POSI MDA TEMP DEW BAT VOL CUE METER(X) OUTER/THREAD CURRENT
LD CUR1 LD CUR3 REEL POSI
DR FG B PLS DR FG A PLS A/C START
SP,412-16A SP,412-12B SP,412-10A SP,412-10B SP,412-14B SP,411-4C SP,411-5A SP,411-5B SP,411-5C SP,411-6A SP,411-6B SP,411-6C SP,411-7A SP,437-14B SP,437-15B SP,411-7C SP,412-13A SP,412-14A SP,412-16C SP,412-14C SP,412-12C (N.C) SP,412-6C SP,412-11A SP,437-15C DET18,339-6 CN590,345-6 CN590,345-1 DET18,339-1 DT,406-26A DT,406-25A CN481,307-10B CN481,307-9A CN481,310-10B CN481,310-9A CAPSTAN MOTOR,311-2 CAPSTAN MOTOR,311-3 REC,400-4C REC,400-12A REC,400-13B REC,400-13C PC63,315-3 PC63,316-3 PC63,314-3 THREAD POTENTIO METER MD,337-23B CN171,338-7 DM,429-9A AE,403-5B MD,337-24B SP,411-21C SP,411-21B SP,412-25C

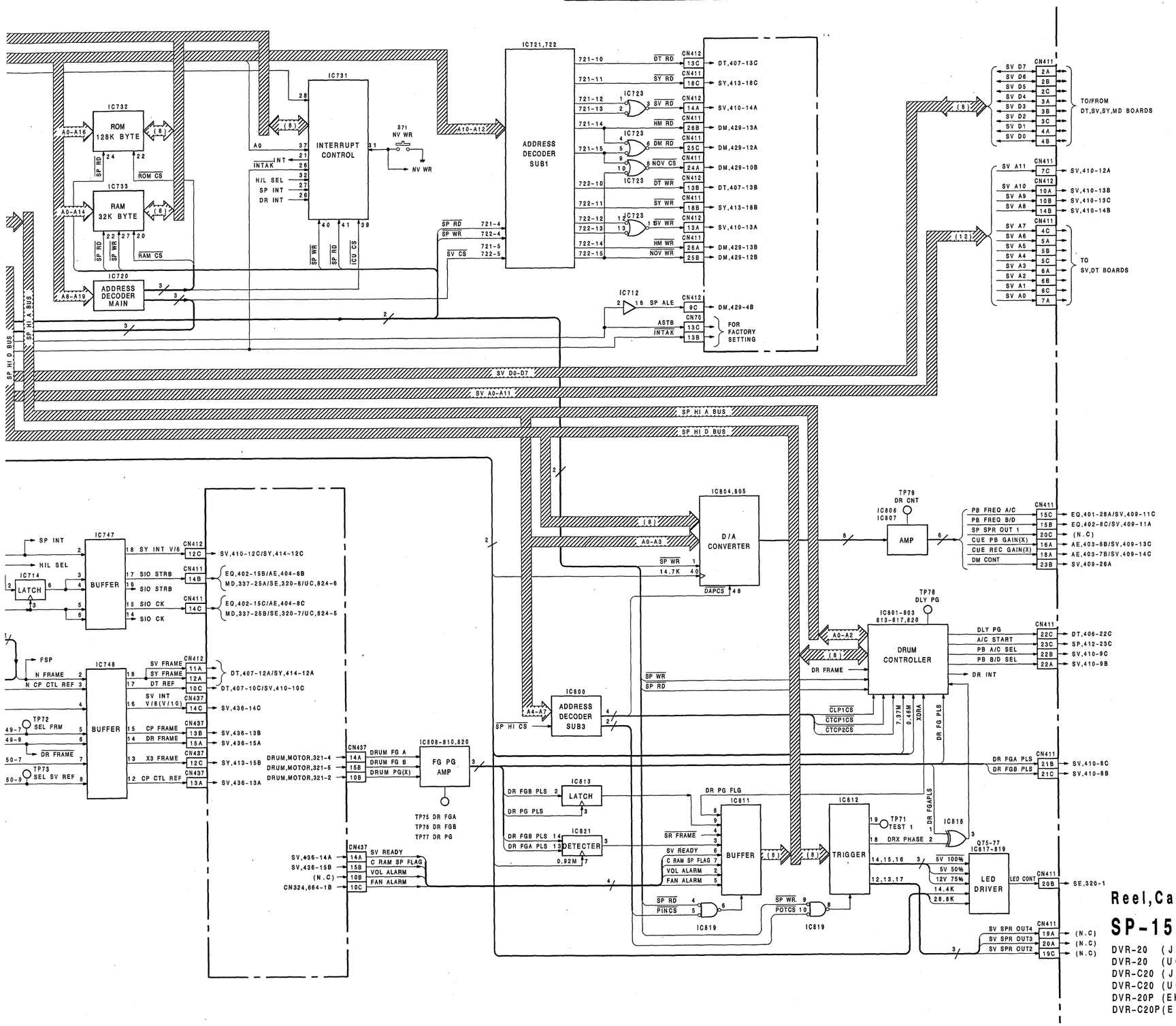


Servo CPU

SV-133 BLOCK DIAGRAM

DVR-20 (J) ;#10001-
DVR-20 (UC) ;#10001-
DVR-C20 (J) ;#10001-
DVR-C20 (UC) ;#10001-
DVR-20P (EK,UC) ;#10001-
DVR-C20P(EK) ;#10001-

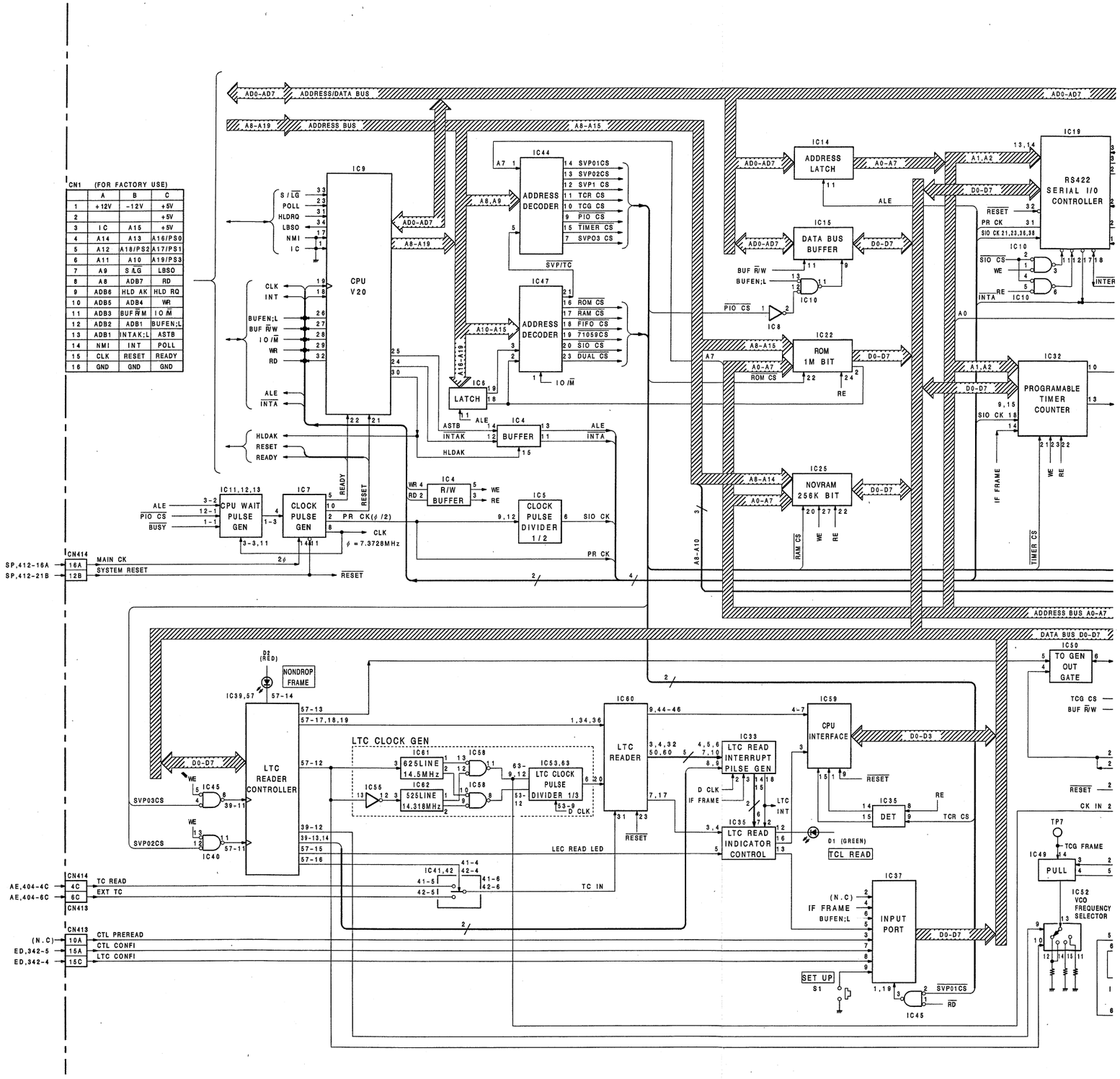

SP CPU DIRECT D BUS D0-D7
SP LO A BUS A0-A19
CN411 25A HM INT
DM,429-11A
DT,407-12B SV,410-12B SY,414-12B DM,429-4A IF,417-7A PS,105-3A
CN412 12B SYSTEM RESET
CN411 14B POP
SOFT RESET
Q78 SW
S70 RESET SW
X76 14.745MHz
IC712
IC709
IC711
IC713
IC701
CLOCK CONTROL. GEN.
7.3MHz
RESET
READY
INT
IC700
CPU
CN437 14B C RAM SP BUSY
SV,436-14B
IC708 LATCH
SV CS
SP CS
CN412 16C SV CK
SV,410-16C
SP CK
SP RESET
IC790-793 WATCH DOG
WD CS
D71 WDT
CN412 16A MAIN CK
SV,410-16A/SY,414-16A
14.7MHz
IC702 ADDRESS BUS BUFFER
IC703 ADDRESS BUS BUFFER
IC704 DATA BUS TRANSCEIVER
SP LO CS
IC710 LATCH
IC714 LATCH
SP RD 12
SP LO DATA 0-7
IC705 ADDRESS BUS BUFFER
IC706 ADDRESS BUFFER
IC707 DATA BUS TRANSCEIVER
SV CS
IC715 ADDRESS BUS BUFFER
IC716 DATA BUS TRANSCEIVER
SP HI CS
SV D0-D7
SP HI A BUS
SP HI D BUS
A16-A19
A8-A15
A0-A7
A0-A11
A0-A14
SP RD
SP WR
128K
32K
CN411 14A SI 0L
CN411 13C SI 0H
CN411 13B SI 1L
CN411 13A SI 1H
CN411 12C SI 2L
CN411 12B SI 2H
CN411 12A SI 3L
CN411 11C SI 3H
SE,320-5
SE,320-4
(N.C)
(N.C)
AE,404-8A
UC,824-3
(N.C)
(N.C)
SERIAL DATA IN
IC785 SELECTOR
H/L SEL
IC781-784 SERIAL→PARALLEL CONVERTER
SIO CK SIO STB
IC780 DECODER
SP PD SI CS
A1-3
A0
CN411 11B SO 0
CN411 11A SO 1
CN411 10C SO 2
CN411 10B SO 3
CN411 10A SO 4
CN411 9C SO 5
MD,337-25C
AE,404-7C
AE,404-7B
EQ,402-14C
VM,722-18A
(N.C)
SERIAL DATA OUT
IC771-776 PARALLEL→SERIAL CONVERTER
IC770 DECODER
SP WR SO CS
SIO
SP LO DATA 0-7
SP LO ADDRESS 0-2
IC760
I/O PORT EXPANDER
IC761,792 RESET
RESET CS
SP RESET
P.PLAY
FORMAT
TP80 TEST 2
TP70 INT JOB
EJECT LAMP
SYSTEM READY
NOV RECALL
NOV STORE
NV WR SW
IC753
Q72,73 SYSTEM HOLD CONT
S72-1 SYSTEM HOLD SW
SYSTEM HOLD
BOARD SENSE 1
BOARD SENSE 3
REC MODE
AU MONI R SEL
AU MONI L SEL
9P/AUX SEL
CN411 21A SE,320-3
CN412 11C AE,404-11C
CN411 24C DM,429-11B
CN411 24B DM,429-10A
CN411 29B DT,406-27B/PS,105-3B
CN411 9A SY,413-9B (N.C)
CN411 9B SV,409-8A (N.C)
CN411 19B REC,400-13A/EQ,402-15A
CN411 16B LO,662-4
CN411 16C LO,662-7
CN437 11C IF,617-10B
CN437 15C SP READY
SV,436-15C
S72-2
S72-3
CN411 28A PS ALARM
CN411 29A OVER HEAT
PS,105-2A
PS,105-7A
CN411 8C SV HOLD CONT
SV,409-8C
Q74 SW
CN411 17C SY OR
CN411 17B SY IR
SY,413-17C
SY,413-17B
TP74 PR CF
CN412 9A PR CF
CN437 13C CP CF
PR,711-4C
SV,436-13C
H/L SEL
FSR
PR FRAME
PIO CS
SP RD
SP WR
SOFT RESET
IC761
CN412 9B PR FRAME
PR,711-3B
IC741,742 REFERENCE SIGNAL GEN.
SP CK
MAIN CK
SP RD 741-32
SP WR 741-37
A0-A2
IC743 PHASE DETECTOR
MAIN CK 17
SP RD 22
PR FRAME 14,16
PR FRAME
IC740 ADDRESS DECODER SUB2
A4-A7
SP LO CS
SI CS
SO CS
PIO CS
RESET CS
WO CS
IC744,751,753 CLOCK THIN OUT
741-10
741-27
742-9,24,27
741-24
IC751
IC745 SIO CONTROL SIGNAL GEN
SP INT
HIL SEL
IC714 LATCH
741-16
741-15,19
742-10 N CP CTL REF
742-18 F CP CTL REF
742-26
IC746 FRAME PULSE GEN
TP81 SV FRM
N FRAME
N/F FRAME
FSP
N CP CTL REF
IC747
BUFFER
IC748
IC749,750 SV REF SELECTOR
TP72 SEL FRM
TP73 SEL SV REF
DR FRAME
F FRAME
F CP CTL REF
P FRAME
P CP CTL REF
P PLAY FORMAT
CN437 12B P FRAME
CN437 12A P CP CTL REF

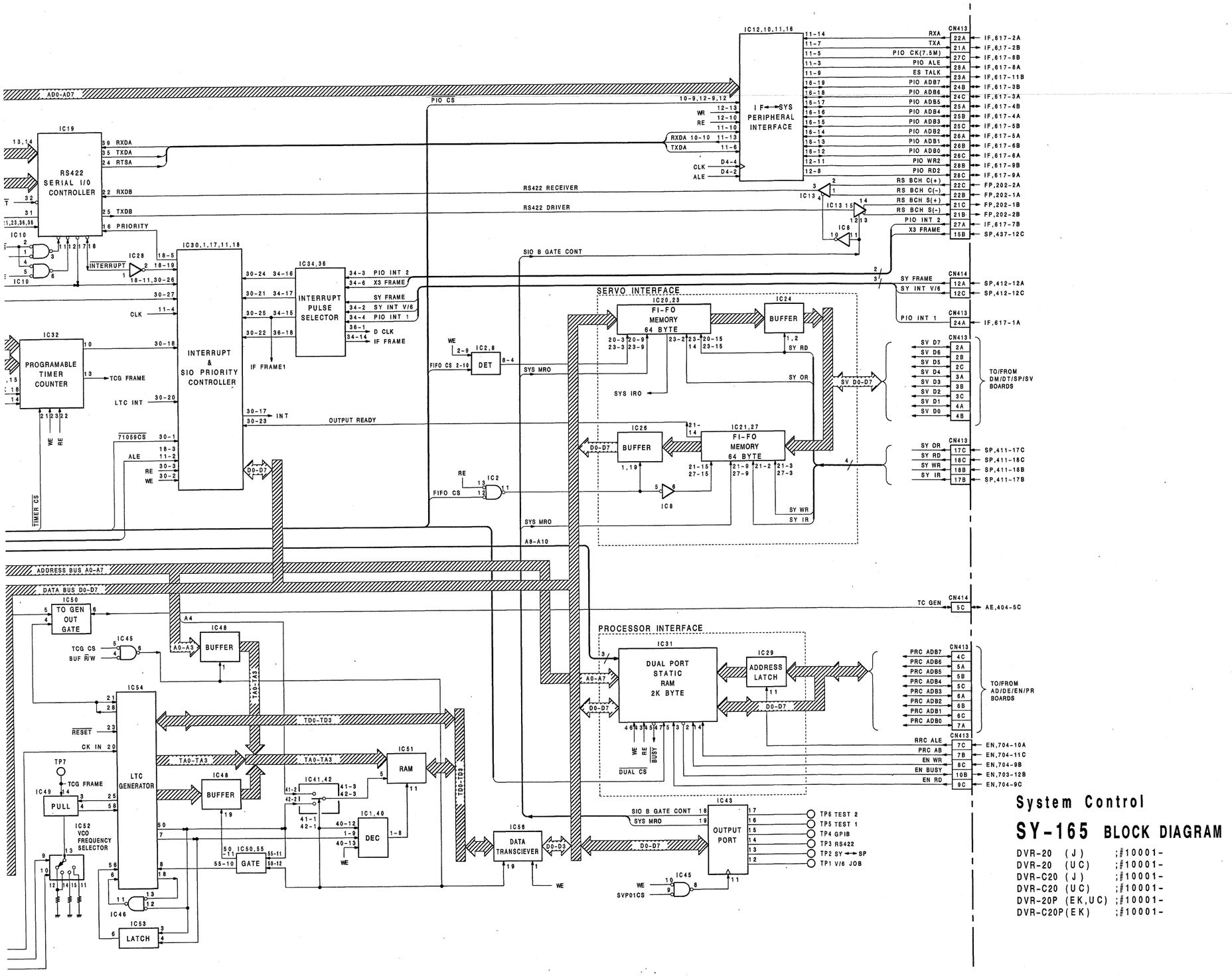


Reel,Capstan,Drum Servo Control

SP-15 BLOCK DIAGRAM

DVR-20 (J) ;#10001-
DVR-20 (UC) ;#10001-
DVR-C20 (J) ;#10001-
DVR-C20 (UC) ;#10001-
DVR-20P (EK,UC) ;#10001-
DVR-C20P(EK) ;#10001-

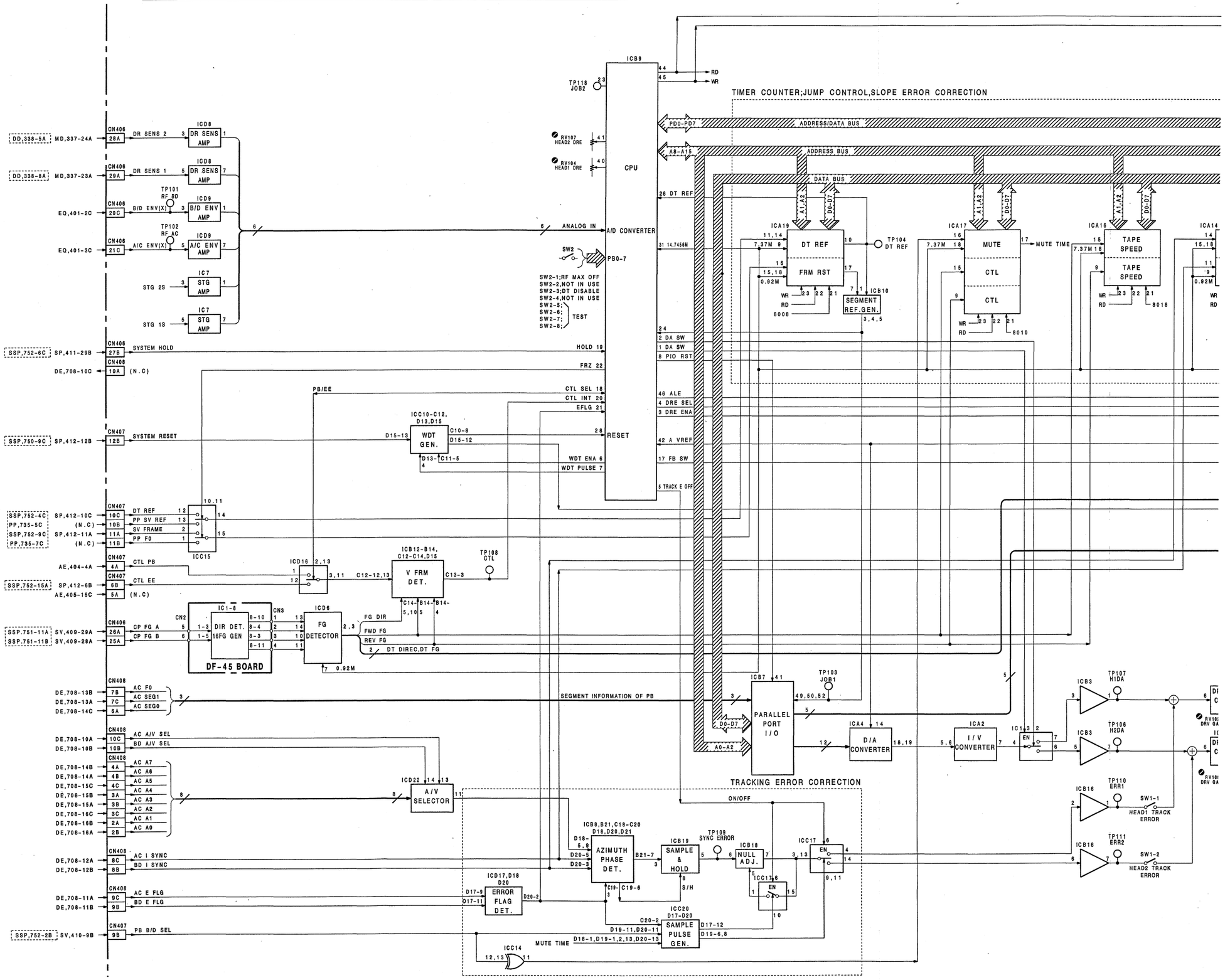

CN1 (FOR FACTORY USE)
A B C
1 +12V -12V +5V
2 +5V
3 IC A15 +5V
4 A14 A13 A16/PS0
5 A12 A18/PS2 A17/PS1
6 A11 A10 A19/PS3
7 A9 S/LG LBSO
8 A8 ADB7 RD
9 ADB6 HLD AK HLD RQ
10 ADB5 ADB4 WR
11 ADB3 BUF R/W IO/M
12 ADB2 ADB1 BUFEN;L
13 ADB1 INTAK;L ASTB
14 NMI INT POLL
15 CLK RESET READY
16 GND GND GND
AD0-AD7 ADDRESS/DATA BUS
A8-A19 ADDRESS BUS
A8-A15
IC9 CPU V20
S/LG POLL HLDRQ LBSO NMI IC
CLK INT BUFEN;L BUF R/W IO/M WR RD ALE INTA HLDAK RESET READY
IC44 ADDRESS DECODER
SVP01CS SVP02CS SVP1 CS TCR CS TCG CS PIO CS TIMER CS SVP03 CS
SVP/TC
IC47 ADDRESS DECODER
ROM CS RAM CS FIFO CS 71059CS SIO CS DUAL CS
IO/M
IC6 LATCH
ASTB INTAK
IC4 BUFFER
IC14 ADDRESS LATCH
IC15 DATA BUS BUFFER
BUF R/W BUFEN;L
IC10
PIO CS
IC8
IC22 ROM 1M BIT
IC25 NOVRAM 256K BIT
IC19 RS422 SERIAL I/O CONTROLLER
RESET PR CK SIO CK 21,23,36,38 SIO CS WE RE INTA INTER
IC32 PROGRAMABLE TIMER COUNTER
SIO CK 18
IF FRAME
IC11,12,13 CPU WAIT PULSE GEN
IC7 CLOCK PULSE GEN
ALE PIO CS BUSY READY RESET
IC4 R/W BUFFER
WR RD WE RE
IC5 CLOCK PULSE DIVIDER 1/2
SIO CK PR CK
CLK φ = 7.3728MHz
CN414 MAIN CK SYSTEM RESET
SP,412-16A SP,412-21B
2φ RESET
A8-A10
IC50 TO GEN OUT GATE
TCG CS BUF R/W
IC59 CPU INTERFACE
IC60 LTC READER
IC33 LTC READ INTERRUPT PILSE GEN
D CLK IF FRAME LTC INT
IC35 DET
TCR CS
IC35 LTC READ INDICATOR CONTROL
D1 (GREEN) TCL READ
LEC READ LED
TC IN
LTC CLOCK GEN
IC61 625LINE 14.5MHz
IC62 525LINE 14.318MHz
IC55 IC58 IC53,63 LTC CLOCK PULSE DIVIDER 1/3
D CLK
IC41,42
D2 (RED) NONDROP FRAME
IC39,57
LTC READER CONTROLLER
SVP03CS SVP02CS
IC45 IC40
CN414 TC READ EXT TC CN413
AE,404-4C AE,404-6C
CN413 CTL PREREAD CTL CONFI LTC CONFI
(N.C) ED,342-5 ED,342-4
IC37 INPUT PORT
(N.C) IF FRAME BUFEN;L
SET UP S1
SVP01CS RD
IC45
IC49 PULL
TP7 TCG FRAME
IC52 VCO FREQUENCY SELECTOR
ADDRESS BUS A0-A7
DATA BUS D0-D7

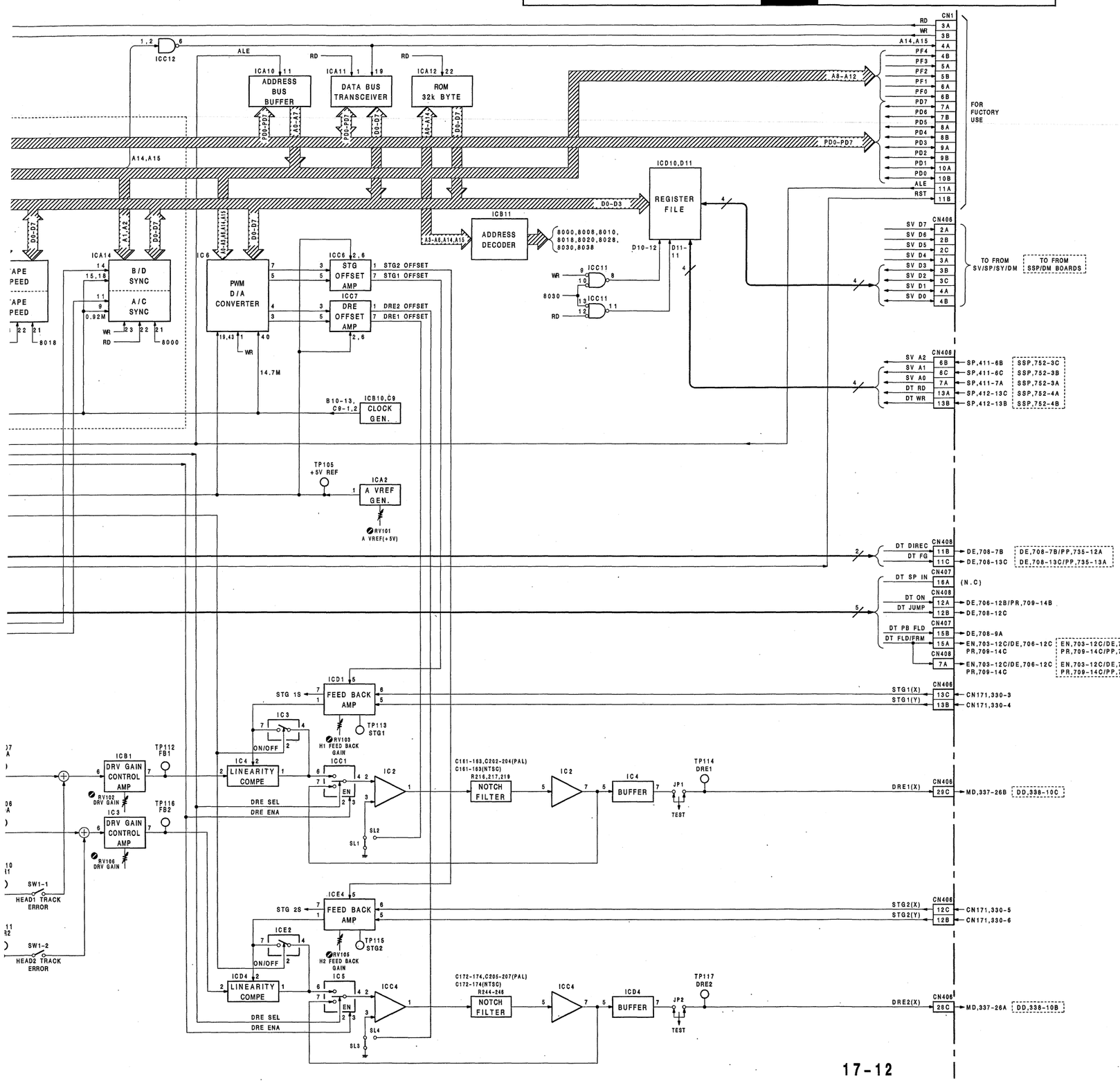


System Control

SY-165 BLOCK DIAGRAM

DVR-20 (J) ;#10001-
DVR-20 (UC) ;#10001-
DVR-C20 (J) ;#10001-
DVR-C20 (UC) ;#10001-
DVR-20P (EK,UC) ;#10001-
DVR-C20P(EK) ;#10001-

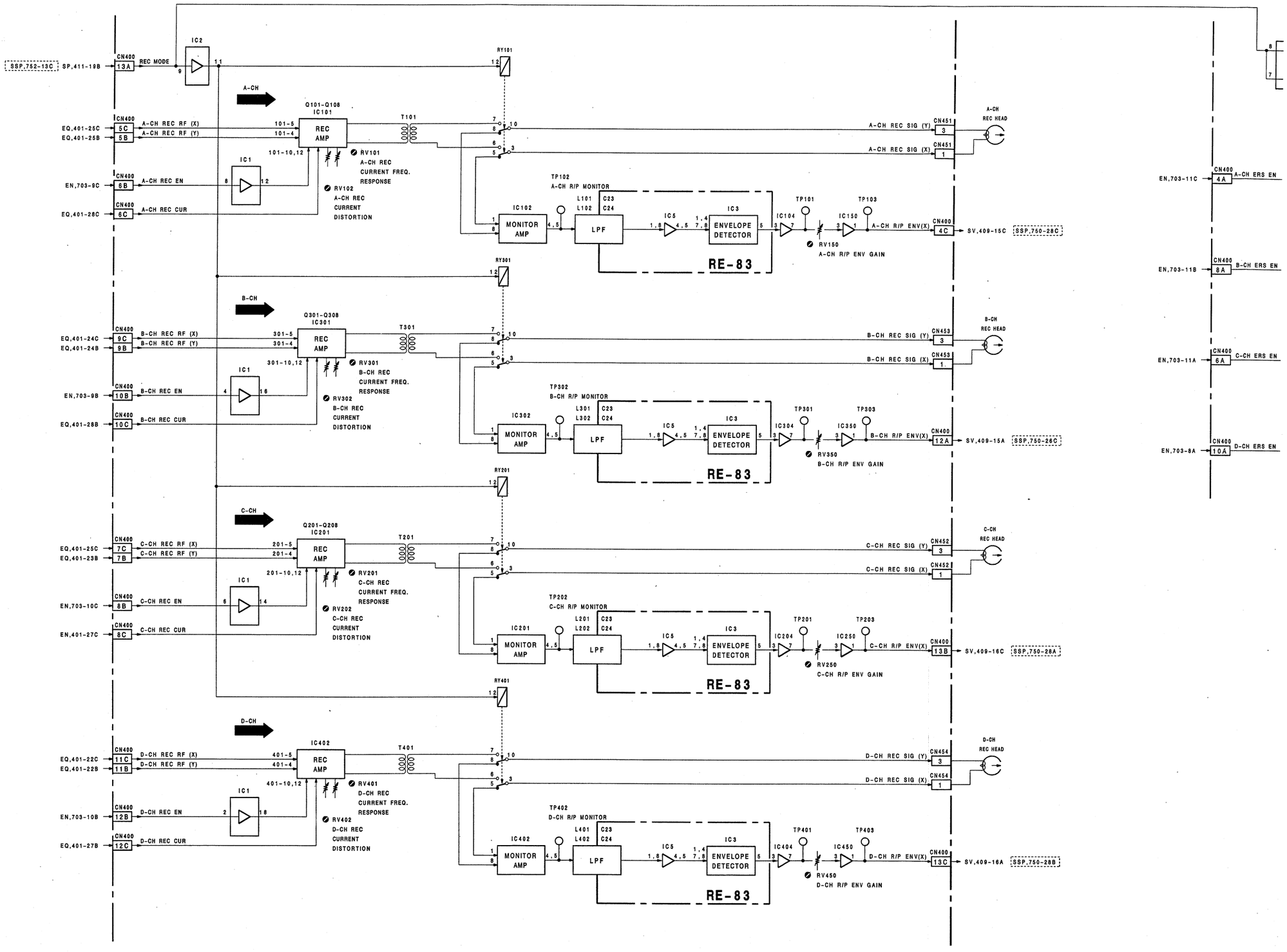

TIMER COUNTER;JUMP CONTROL,SLOPE ERROR CORRECTION
ADDRESS/DATA BUS
ADDRESS BUS
DATA BUS
CPU
A/D CONVERTER
PB0-7
RESET
ANALOG IN
HOLD 19
FRZ 22
CTL SEL 18
CTL INT 20
EFLG 21
WDT ENA 6
WDT PULSE 7
RD
WR
26 DT REF
31 14.7456M
24
2 DA SW
1 DA SW
8 PIO RST
46 ALE
4 DRE SEL
3 DRE ENA
42 A VREF
17 FB SW
5 TRACK E OFF
ICA19 DT REF FRM RST
ICA17 MUTE CTL CTL
ICA16 TAPE SPEED TAPE SPEED
ICA14
TP104 DT REF
MUTE TIME
ICB10 SEGMENT REF.GEN.
TP101 RF_BD
TP102 RF_AC
SW2
SW2-1;RF MAX OFF
SW2-2,NOT IN USE
SW2-3;DT DISABLE
SW2-4,NOT IN USE
SW2-5;
SW2-6;
SW2-7;
SW2-8;
TEST
TP116 JOB2
RV107 HEAD2 DRE
RV104 HEAD1 DRE
ICB9
ICD8 DR SENS AMP
ICD9 B/D ENV AMP
ICD9 A/C ENV AMP
IC7 STG AMP
IC7 STG AMP
DD,338-5A MD,337-24A
DD,338-9A MD,337-23A
EQ,401-2C
EQ,401-3C
STG 2S
STG 1S
SSP,752-6C SP,411-29B
DE,708-10C (N.C)
SSP,750-9C SP,412-12B
SSP,752-4C SP,412-10C
PP,735-5C (N.C)
SSP,752-9C SP,412-11A
PP,735-7C (N.C)
AE,404-4A
SSP,752-15A SP,412-6B
AE,405-15C (N.C)
SSP,751-11A SV,409-29A
SSP,751-11B SV,409-28A
SSP,752-2B SV,410-9B
SYSTEM HOLD
SYSTEM RESET
DT REF
PP SV REF
SV FRAME
PP F0
CTL PB
CTL EE
CP FG A
CP FG B
PB/EE
ICC10-C12, D13,D15 WDT GEN.
ICC15
ICD16
V FRM DET.
ICB12-B14, C12-C14,D15
TP108 CTL
IC1-8 DIR DET. 16FG GEN
DF-45 BOARD
ICD6 FG DETECTOR
FG DIR
FWD FG
REV FG
DT DIREC,DT FG
0.92M
SEGMENT INFORMATION OF PB
PARALLEL PORT I/O
TP103 JOB1
D0-D7
A0-A2
D/A CONVERTER
I/V CONVERTER
TP107 H1DA
TP106 H2DA
TP110 ERR1
TP111 ERR2
SW1-1 HEAD1 TRACK ERROR
SW1-2 HEAD2 TRACK ERROR
TRACKING ERROR CORRECTION
ON/OFF
ICB8,B21,C18-C20 D18,D20,D21 AZIMUTH PHASE DET.
ICB19 SAMPLE & HOLD
TP109 SYNC ERROR
ICB18 NULL ADJ.
ICC17
ICD17,D18 D20 ERROR FLAG DET.
ICC20 D17-D20 SAMPLE PULSE GEN.
ICD22 A/V SELECTOR
ICC14
MUTE TIME
AC F0
AC SEG1
AC SEG0
AC A/V SEL
BD A/V SEL
AC A7
AC A6
AC A5
AC A4
AC A3
AC A2
AC A1
AC A0
AC I SYNC
BD I SYNC
AC E FLG
BD E FLG
PB B/D SEL

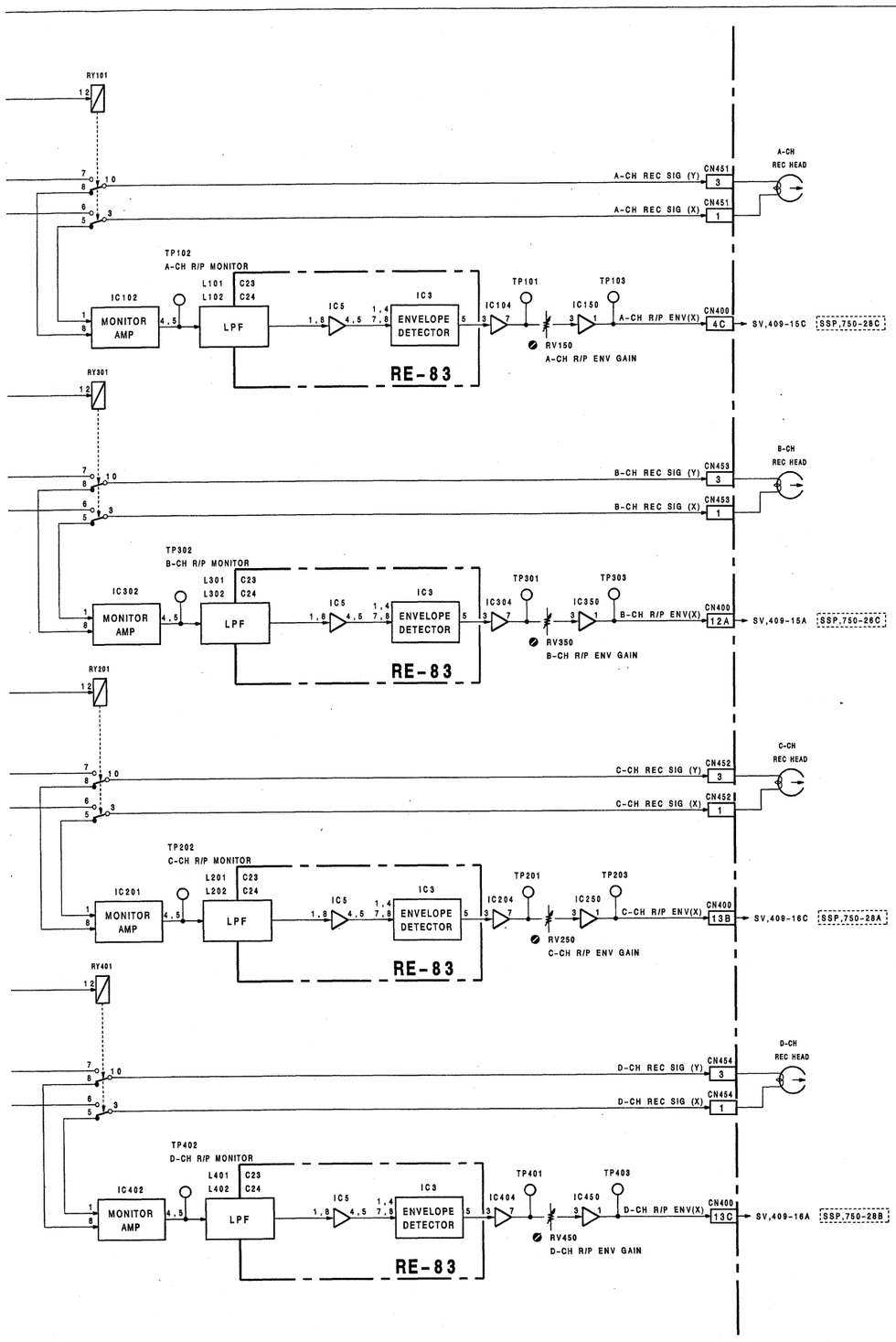


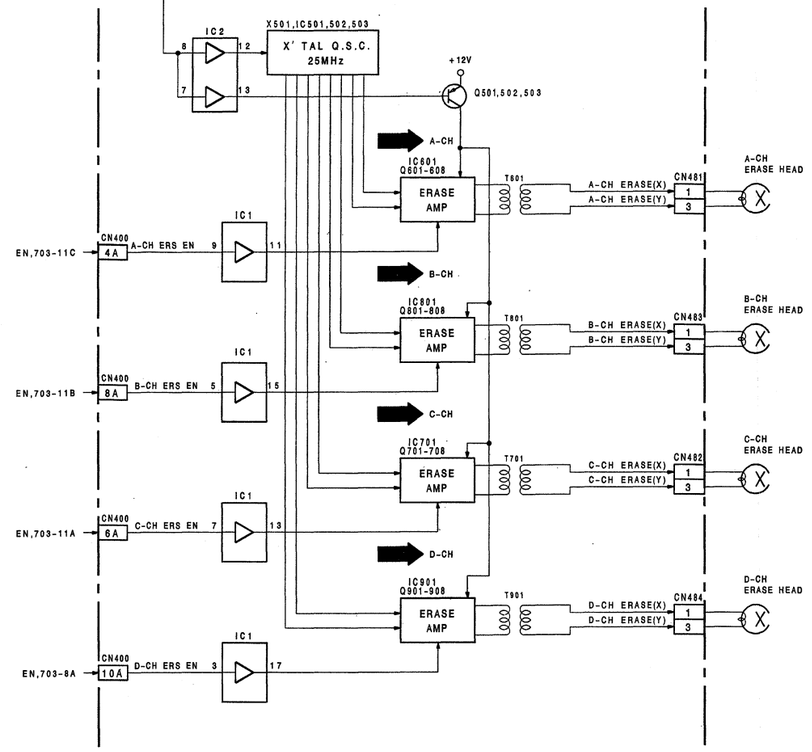
NOTE: [ ] (CONNECTOR'S DESTINATION)
SHOW DVR-28/28P

DT-16 DF-45 BLOCK DIAGRAM

DVR-20 (J) ;#10001-
DVR-20 (UC) ;#10001-
DVR-C20 (J) ;#10001-
DVR-C20 (UC) ;#10001-
DVR-20P (EK,UC);#10001-
DVR-C20P(EK) ;#10001-
DVR-28 (J) ;#10001-
DVR-28 (UC) ;#10001-
DVR-28P (EK,UC);#10001-


SSP,752-13C
SP,411-19B
CN400 13A REC MODE
IC2
RY101
A-CH
Q101-Q108 IC101
EQ,401-25C CN400 5C A-CH REC RF (X)
EQ,401-25B 5B A-CH REC RF (Y)
101-5
101-4
REC AMP
T101
101-10,12
RV101 A-CH REC CURRENT FREQ. RESPONSE
RV102 A-CH REC CURRENT DISTORTION
IC1
EN,703-9C CN400 6B A-CH REC EN
EQ,401-28C 6C A-CH REC CUR
TP102 A-CH R/P MONITOR
IC102 MONITOR AMP
L101 L102 C23 C24
LPF
IC5
IC3 ENVELOPE DETECTOR
RE-83
IC104
TP101
IC150
TP103
RV150 A-CH R/P ENV GAIN
A-CH REC SIG (Y) CN451 3
A-CH REC SIG (X) CN451 1
A-CH REC HEAD
CN400 4C A-CH R/P ENV(X)
SV,409-15C SSP,750-28C
RY301
B-CH
Q301-Q308 IC301
EQ,401-24C CN400 9C B-CH REC RF (X)
EQ,401-24B 9B B-CH REC RF (Y)
301-5
301-4
T301
301-10,12
RV301 B-CH REC CURRENT FREQ. RESPONSE
RV302 B-CH REC CURRENT DISTORTION
EN,703-9B CN400 10B B-CH REC EN
EQ,401-28B 10C B-CH REC CUR
TP302 B-CH R/P MONITOR
IC302 MONITOR AMP
L301 L302 C23 C24
LPF
IC5
IC3 ENVELOPE DETECTOR
RE-83
IC304
TP301
IC350
TP303
RV350 B-CH R/P ENV GAIN
B-CH REC SIG (Y) CN453 3
B-CH REC SIG (X) CN453 1
B-CH REC HEAD
CN400 12A B-CH R/P ENV(X)
SV,409-15A SSP,750-28C
RY201
C-CH
Q201-Q208 IC201
EQ,401-25C CN400 7C C-CH REC RF (X)
EQ,401-23B 7B C-CH REC RF (Y)
201-5
201-4
REC AMP
T201
201-10,12
RV201 C-CH REC CURRENT FREQ. RESPONSE
RV202 C-CH REC CURRENT DISTORTION
EN,703-10C CN400 8B C-CH REC EN
EN,401-27C 8C C-CH REC CUR
TP202 C-CH R/P MONITOR
IC201 MONITOR AMP
L201 L202 C23 C24
LPF
IC5
IC3 ENVELOPE DETECTOR
RE-83
IC204
TP201
IC250
TP203
RV250 C-CH R/P ENV GAIN
C-CH REC SIG (Y) CN452 3
C-CH REC SIG (X) CN452 1
C-CH REC HEAD
CN400 13B C-CH R/P ENV(X)
SV,409-16C SSP,750-28A
RY401
D-CH
IC402
EQ,401-22C CN400 11C D-CH REC RF (X)
EQ,401-22B 11B D-CH REC RF (Y)
401-5
401-4
REC AMP
T401
401-10,12
RV401 D-CH REC CURRENT FREQ. RESPONSE
RV402 D-CH REC CURRENT DISTORTION
EN,703-10B CN400 12B D-CH REC EN
EQ,401-27B 12C D-CH REC CUR
TP402 D-CH R/P MONITOR
IC402 MONITOR AMP
L401 L402 C23 C24
LPF
IC5
IC3 ENVELOPE DETECTOR
RE-83
IC404
TP401
IC450
TP403
RV450 D-CH R/P ENV GAIN
D-CH REC SIG (Y) CN454 3
D-CH REC SIG (X) CN454 1
D-CH REC HEAD
CN400 13C D-CH R/P ENV(X)
SV,409-16A SSP,750-28B
EN,703-11C CN400 4A A-CH ERS EN
EN,703-11B 8A B-CH ERS EN
EN,703-11A 6A C-CH ERS EN
EN,703-8A 10A D-CH ERS EN

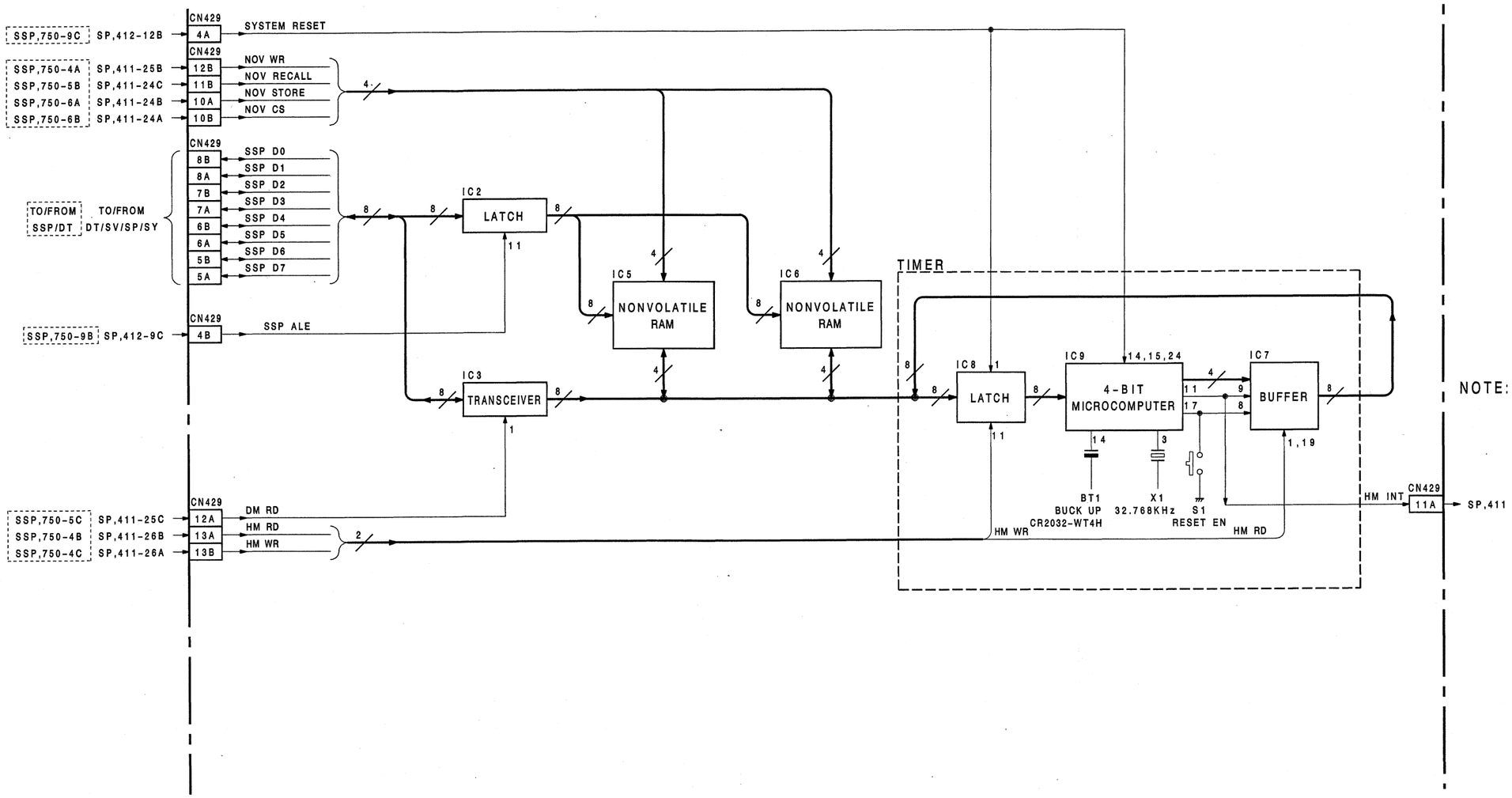




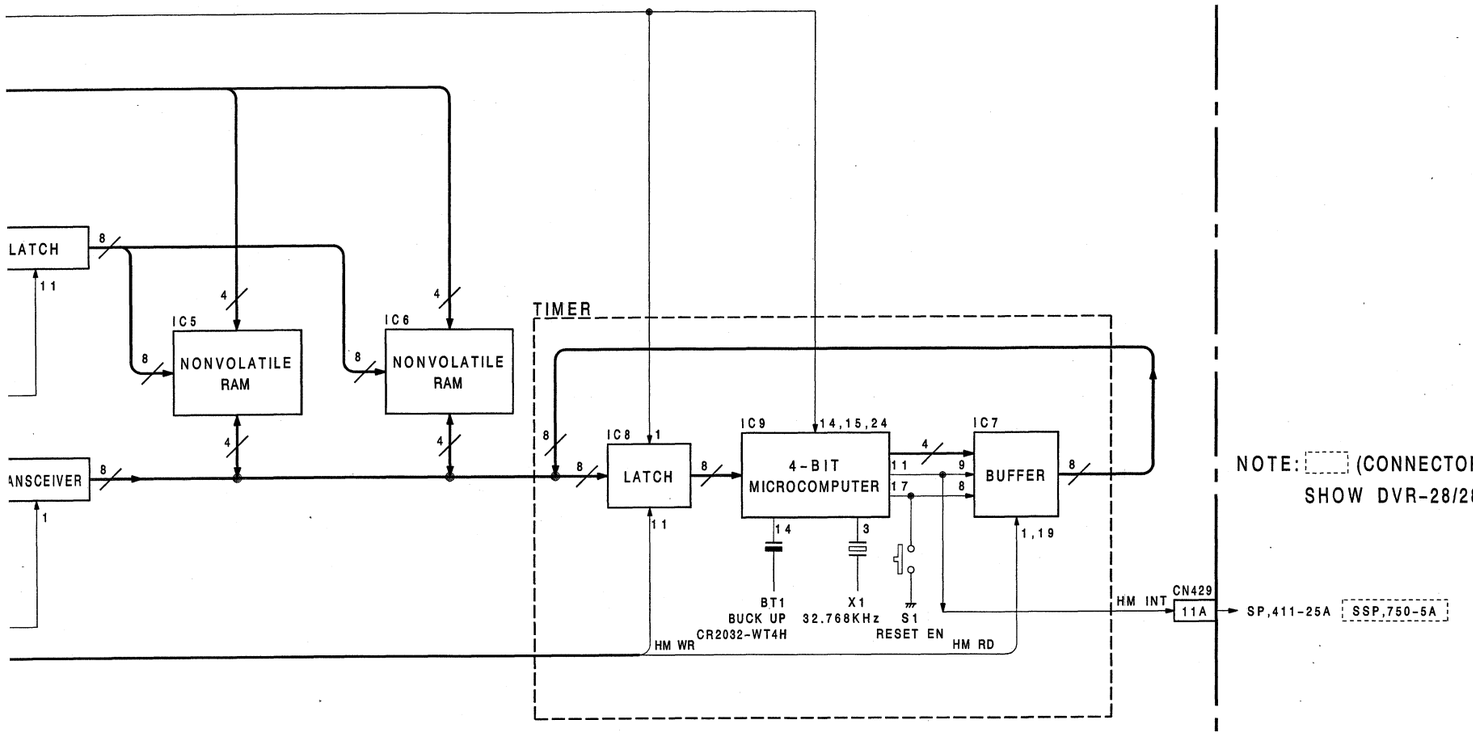
NOTE: [ ] (CONNECTOR'S DESTINATION)
SHOW DVR-28/28P

REC-11 RE-83 BLOCK DIAGRAM

DVR-20 (J) ;#10001-
DVR-20 (UC) ;#10001-
DVR-C20 (J) ;#10001-
DVR-C20 (UC) ;#10001-
DVR-20P (EK,UC);#10001-
DVR-C20P(EK) ;#10001-
DVR-28 (J) ;#10001-
DVR-28 (UC) ;#10001-
DVR-28P (EK,UC);#10001-


SSP,750-9C
SP,412-12B
CN429
4A
SYSTEM RESET
SSP,750-4A
SSP,750-5B
SSP,750-6A
SSP,750-6B
SP,411-25B
SP,411-24C
SP,411-24B
SP,411-24A
12B
11B
10A
10B
NOV WR
NOV RECALL
NOV STORE
NOV CS
TO/FROM SSP/DT
TO/FROM DT/SV/SP/SY
8B
8A
7B
7A
6B
6A
5B
5A
SSP D0
SSP D1
SSP D2
SSP D3
SSP D4
SSP D5
SSP D6
SSP D7
SSP,750-9B
SP,412-9C
4B
SSP ALE
IC2
LATCH
IC3
TRANSCEIVER
IC5
NONVOLATILE RAM
IC6
NONVOLATILE RAM
TIMER
IC8
LATCH
IC9
4-BIT MICROCOMPUTER
IC7
BUFFER
BT1
BUCK UP
CR2032-WT4H
X1
32.768KHz
S1
RESET EN
HM WR
HM RD
HM INT
11A
SP,411
SSP,750-5C
SSP,750-4B
SSP,750-4C
SP,411-25C
SP,411-26B
SP,411-26A
12A
13A
13B
DM RD
HM RD
HM WR
NOTE:

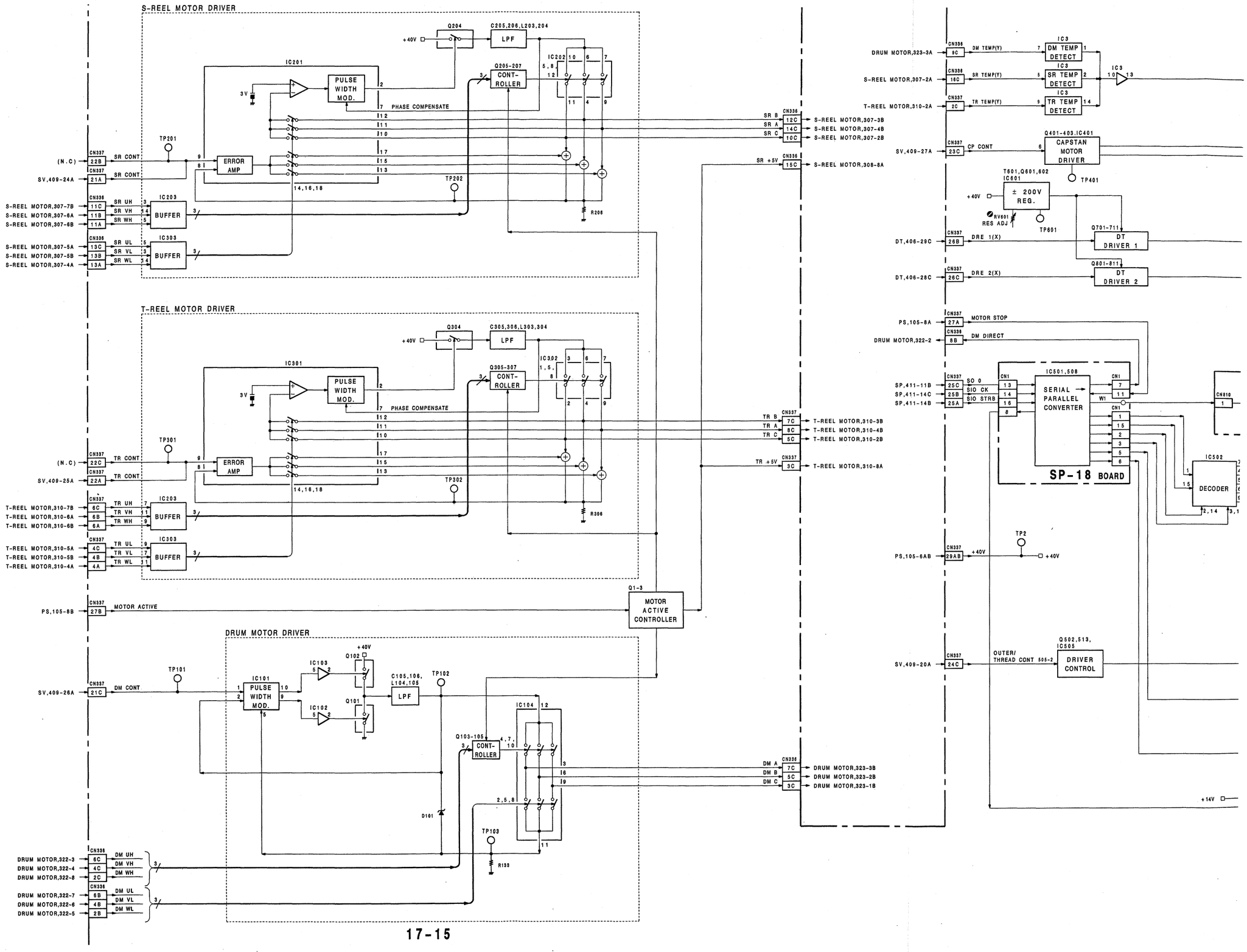
17-14



NOTE: [ ] (CONNECTOR'S DESTINATION)
SHOW DVR-28/28P

DM-63 BLOCK DIAGRAM

DVR-20 (J) ;#10001-
DVR-20 (UC) ;#10001-
DVR-C20 (J) ;#10001-
DVR-C20 (UC) ;#10001-
DVR-20P (EK,UC);#10001-
DVR-C20P(EK) ;#10001-
DVR-28 (J) ;#10001-
DVR-28 (UC) ;#10001-
DVR-28P (EK,UC);#10001-


S-REEL MOTOR DRIVER
T-REEL MOTOR DRIVER
DRUM MOTOR DRIVER
PULSE WIDTH MOD.
ERROR AMP
BUFFER
CONT-ROLLER
LPF
PHASE COMPENSATE
MOTOR ACTIVE CONTROLLER
SERIAL PARALLEL CONVERTER
SP-18 BOARD
DECODER
DM TEMP DETECT
SR TEMP DETECT
TR TEMP DETECT
CAPSTAN MOTOR DRIVER
± 200V REG.
DT DRIVER 1
DT DRIVER 2
DRIVER CONTROL
SR CONT
TR CONT
DM CONT
MOTOR STOP
DM DIRECT
MOTOR ACTIVE
OUTER/ THREAD CONT 505-2
SR UH
SR VH
SR WH
SR UL
SR VL
SR WL
TR UH
TR VH
TR WH
TR UL
TR VL
TR WL
DM UH
DM VH
DM WH
DM UL
DM VL
DM WL
SR B
SR A
SR C
SR +5V
TR B
TR A
TR C
TR +5V
DM A
DM B
DM C
DM TEMP(Y)
SR TEMP(Y)
TR TEMP(Y)
CP CONT
DRE 1(X)
DRE 2(X)
SO 0
SIO CK
SIO STRB
+40V
+14V
RES ADJ
RV601
TP101
TP201
TP202
TP301
TP302
TP401
TP601
TP103
TP2
D101
R206
R306
R133
IC101
IC201
IC301
IC202
IC302
IC203
IC303
IC103
IC102
IC104
IC501,508
IC502
IC505
Q204
Q205-207
Q304
Q305-307
Q102
Q101
Q103-105
Q401-403,IC401
Q701-711
Q801-811
Q502,513,
C205,206,L203,204
C305,306,L303,304
C105,106,
L104,105
T601,Q601,602
IC601
Q1-3
(N.C)
SV,409-24A
SV,409-25A
SV,409-26A
SV,409-27A
SV,409-20A
S-REEL MOTOR,307-7B
S-REEL MOTOR,307-6A
S-REEL MOTOR,307-6B
S-REEL MOTOR,307-5A
S-REEL MOTOR,307-5B
S-REEL MOTOR,307-4A
S-REEL MOTOR,307-3B
S-REEL MOTOR,307-4B
S-REEL MOTOR,307-2B
S-REEL MOTOR,308-8A
T-REEL MOTOR,310-7B
T-REEL MOTOR,310-6A
T-REEL MOTOR,310-6B
T-REEL MOTOR,310-5A
T-REEL MOTOR,310-5B
T-REEL MOTOR,310-4A
T-REEL MOTOR,310-3B
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T-REEL MOTOR,310-2B
T-REEL MOTOR,310-8A
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DRUM MOTOR,322-3
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DRUM MOTOR,322-8
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DRUM MOTOR,322-6
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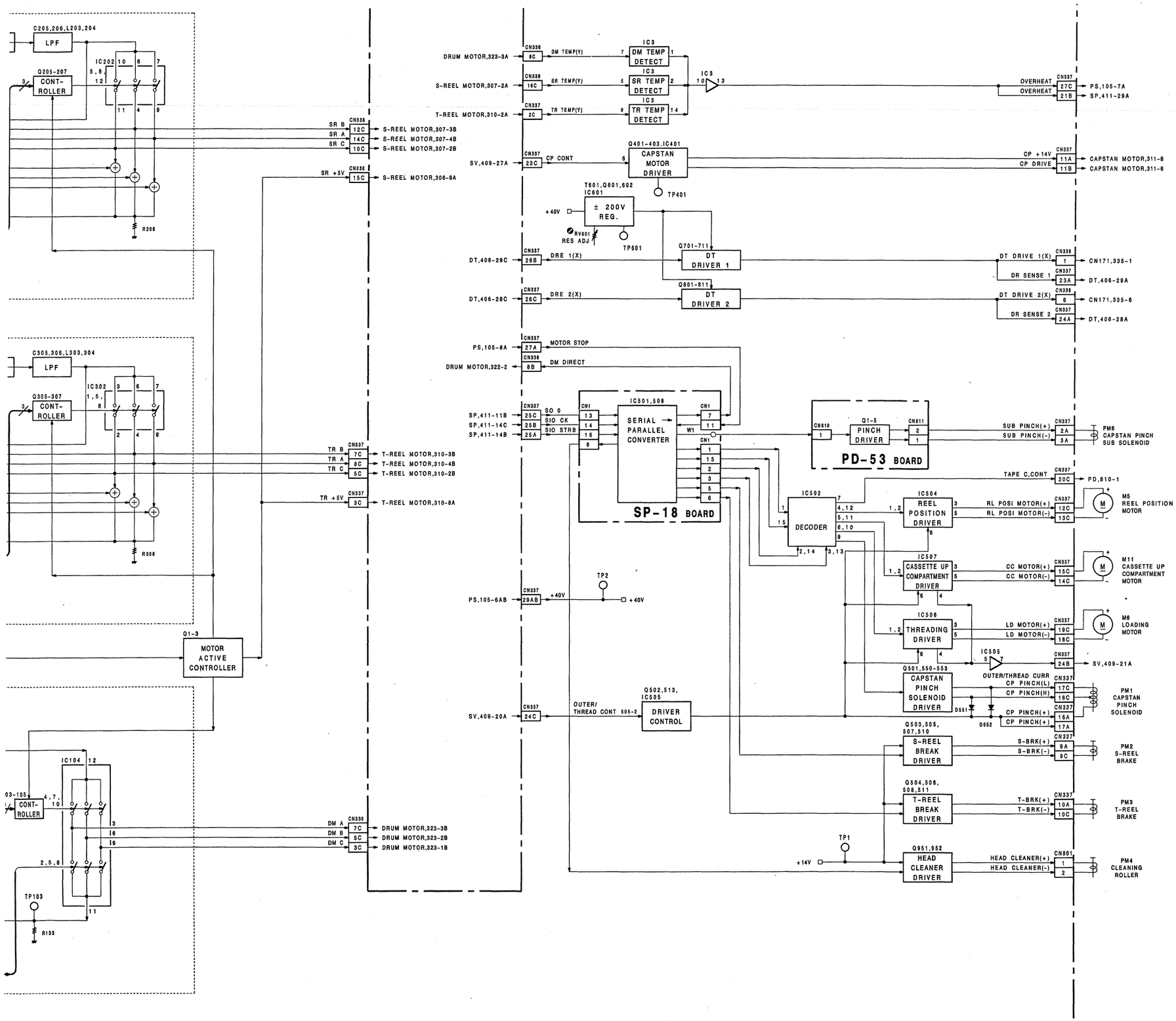
DRUM MOTOR,323-1B
DRUM MOTOR,323-3A
S-REEL MOTOR,307-2A
T-REEL MOTOR,310-2A
DT,406-29C
DT,406-28C

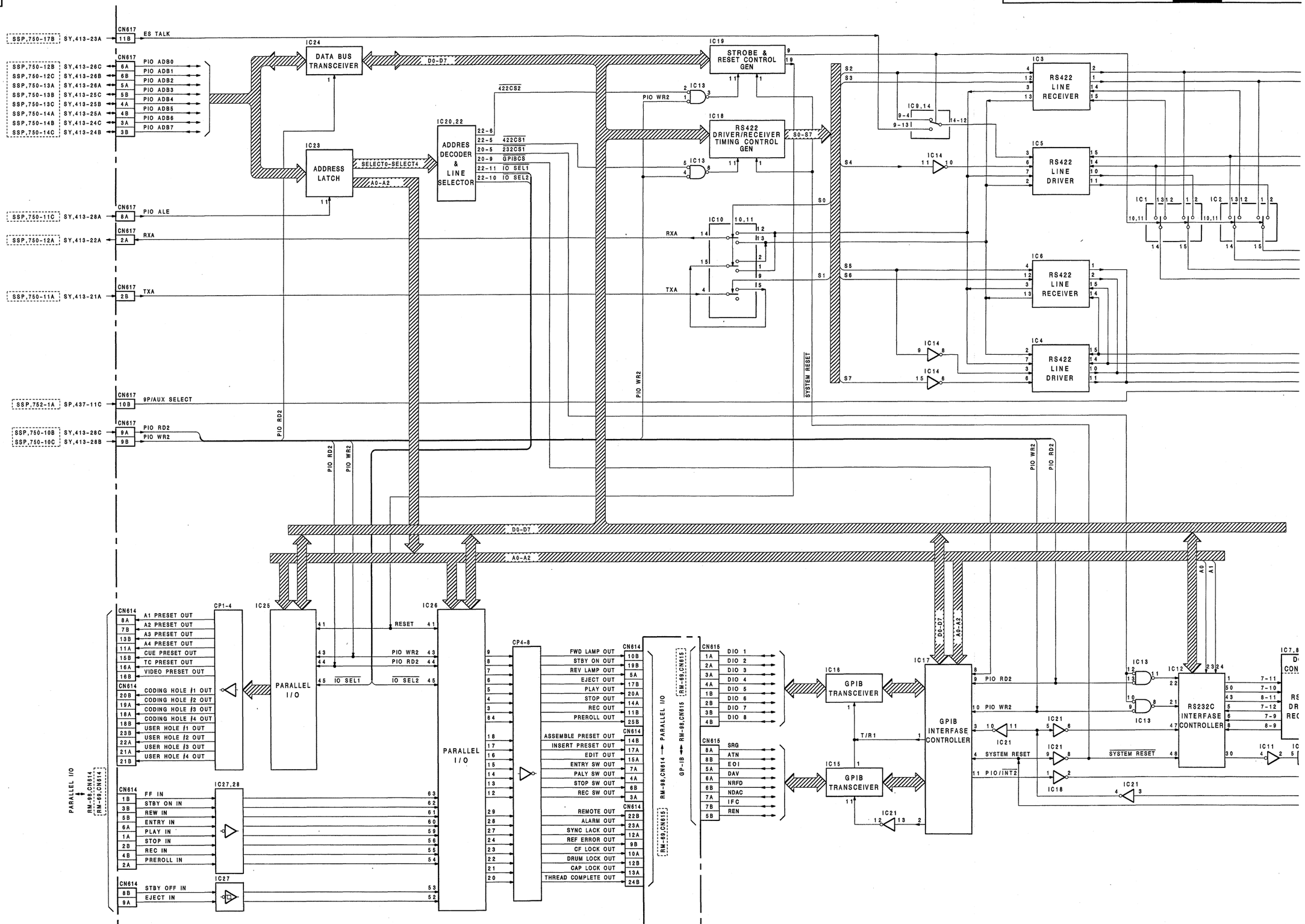


MD-50 PD-53 SP-18

BLOCK DIAGRAM

DVR-20 (J) ;#10001-
DVR-20 (UC) ;#10001-
DVR-C20 (J) ;#10001-
DVR-C20 (UC) ;#10001-
DVR-20P (EK,UC);#10001-
DVR-C20P(EK) ;#10001-

BLOCK DIAGRAM IF-331 IF-331 BI



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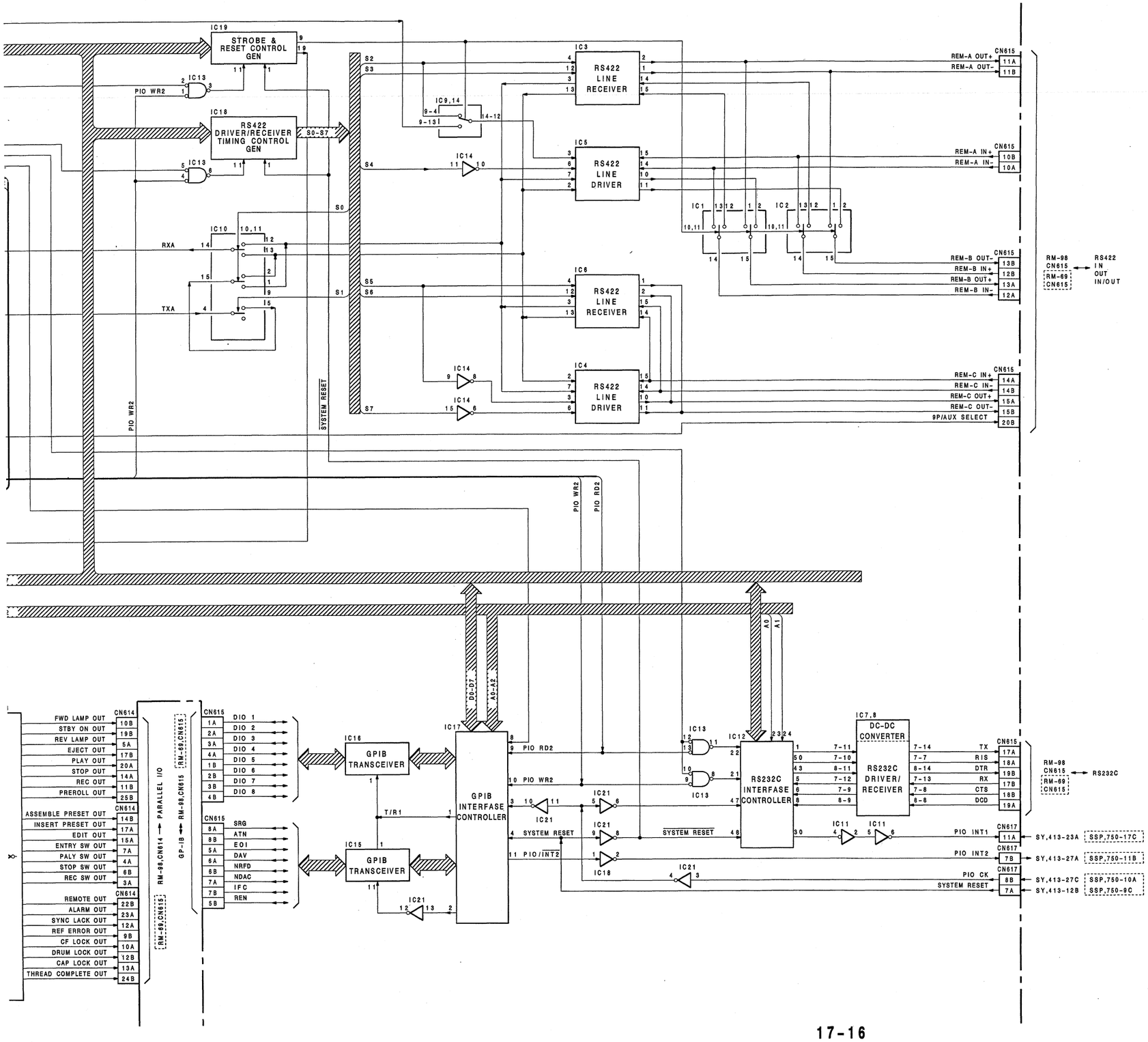
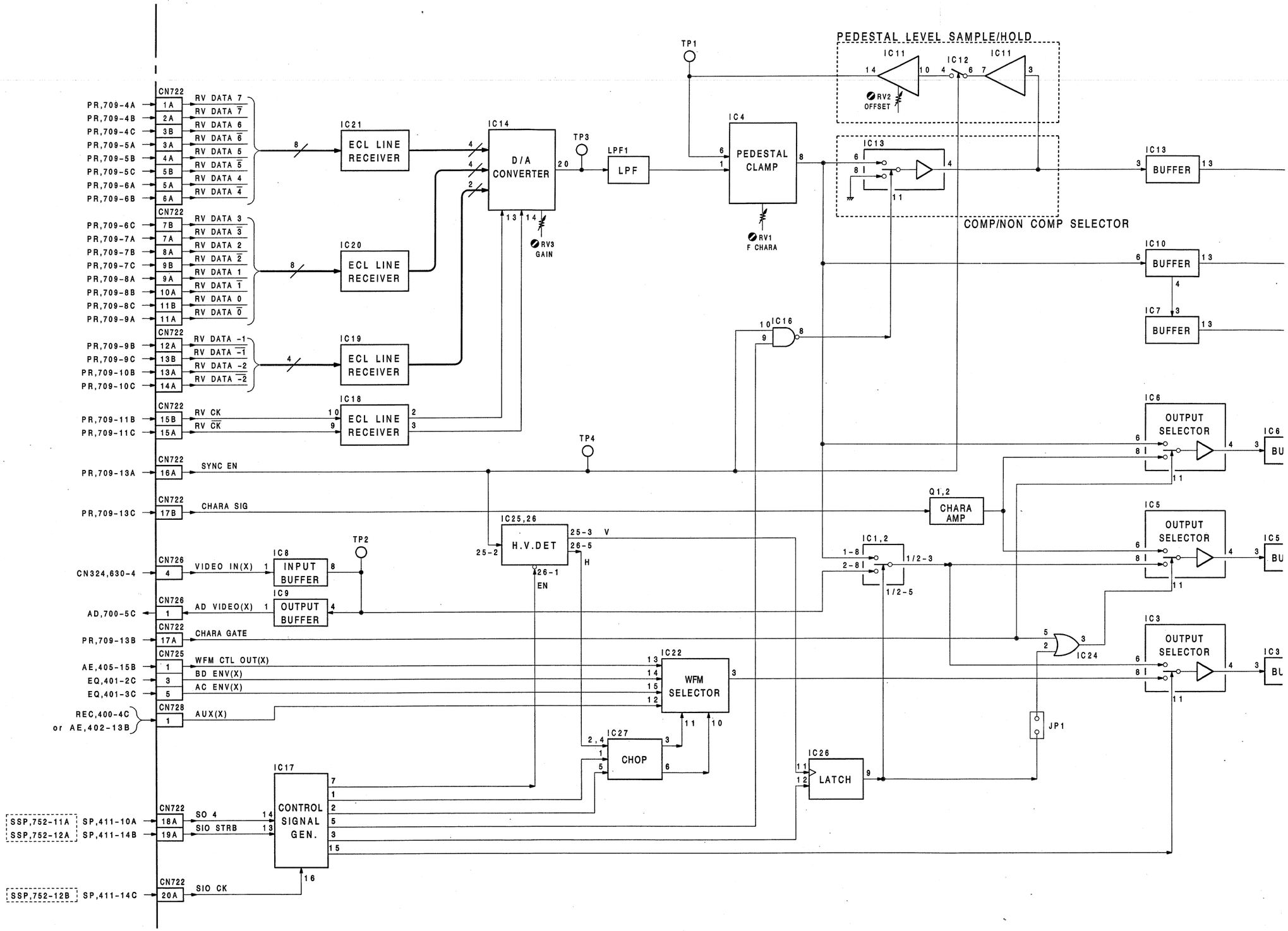
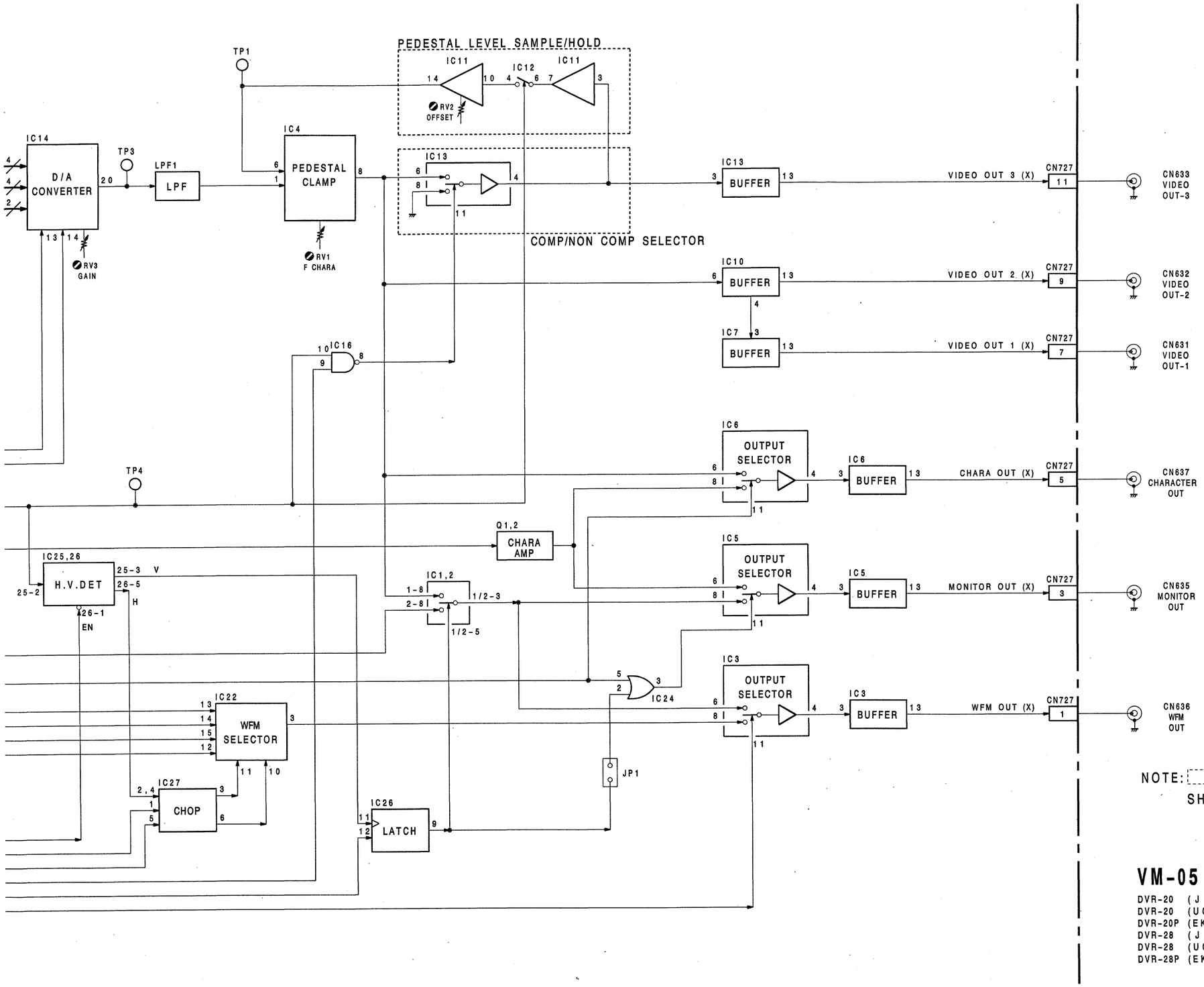


NOTE: [ ] (CONNECTOR'S DESTINATION)
SHOW DVR-28/28P

IF-331 BLOCK DIAGRAM

DVR-20 (J) ;#10001-
DVR-20 (UC) ;#10001-
DVR-C20 (J) ;#10001-
DVR-C20 (UC) ;#10001-
DVR-20P (EK,UC);#10001-
DVR-C20P (EK) ;#10001-
DVR-28 (J) ;#10001-
DVR-28 (UC) ;#10001-
DVR-28P (EK,UC);#10001-

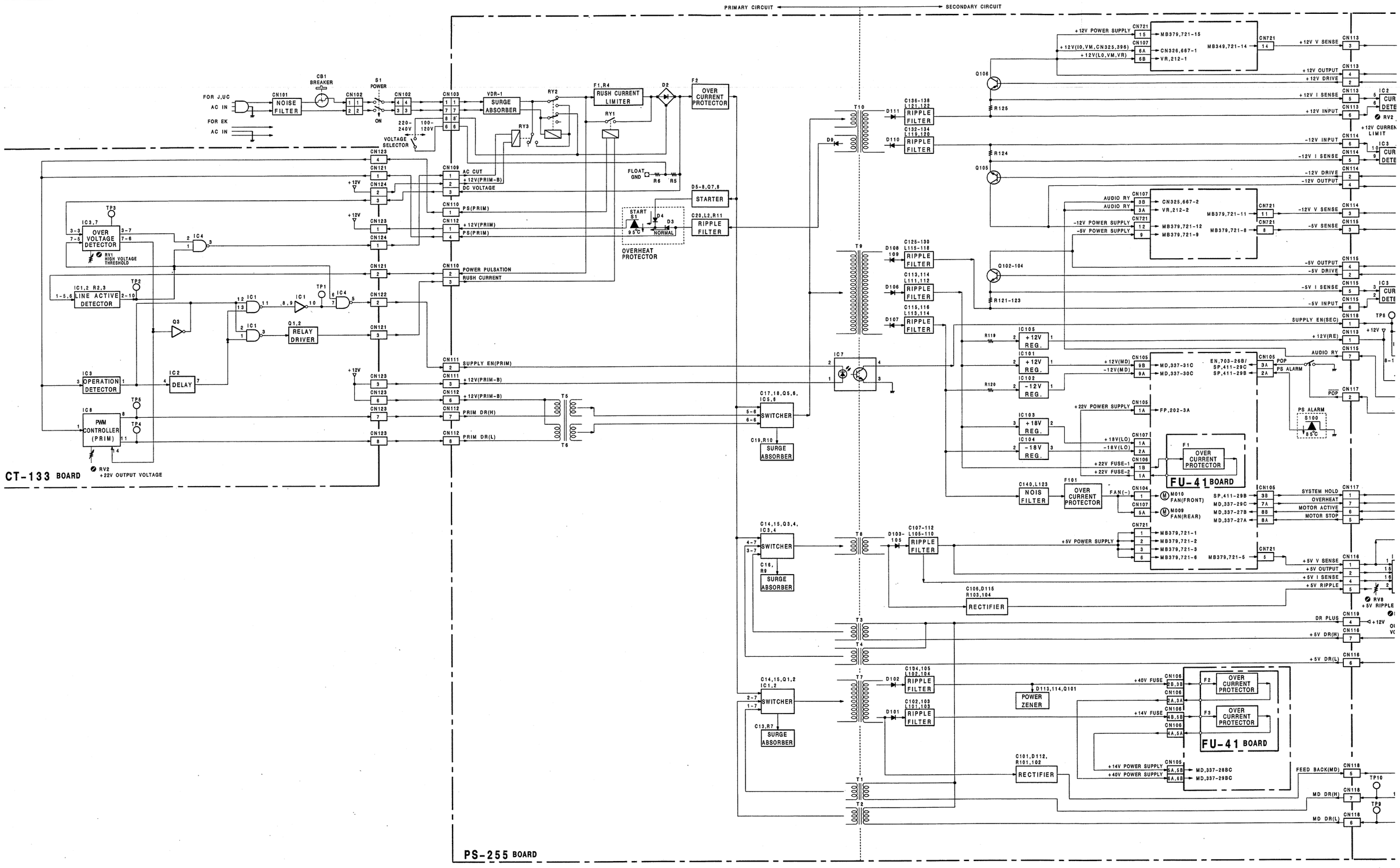

PEDESTAL LEVEL SAMPLE/HOLD
IC11
IC12
IC11
RV2 OFFSET
TP1
IC4
PEDESTAL CLAMP
RV1 F CHARA
IC13
COMP/NON COMP SELECTOR
IC13 BUFFER
IC10 BUFFER
IC7 BUFFER
IC16
IC6 OUTPUT SELECTOR
IC5 OUTPUT SELECTOR
IC3 OUTPUT SELECTOR
Q1,2 CHARA AMP
IC1,2
1/2-3
1/2-5
IC24
JP1
IC26 LATCH
IC27 CHOP
IC22 WFM SELECTOR
IC21 ECL LINE RECEIVER
IC20 ECL LINE RECEIVER
IC19 ECL LINE RECEIVER
IC18 ECL LINE RECEIVER
IC14 D/A CONVERTER
RV3 GAIN
TP3
LPF1
LPF
TP4
IC25,26 H.V.DET
TP2
IC8 INPUT BUFFER
IC9 OUTPUT BUFFER
IC17 CONTROL SIGNAL GEN.
CN722
RV DATA 7
RV DATA 7
RV DATA 6
RV DATA 6
RV DATA 5
RV DATA 5
RV DATA 4
RV DATA 4
RV DATA 3
RV DATA 3
RV DATA 2
RV DATA 2
RV DATA 1
RV DATA 1
RV DATA 0
RV DATA 0
RV DATA -1
RV DATA -1
RV DATA -2
RV DATA -2
RV CK
RV CK
SYNC EN
CHARA SIG
CHARA GATE
CN726
VIDEO IN(X)
AD VIDEO(X)
CN725
WFM CTL OUT(X)
BD ENV(X)
AC ENV(X)
CN728
AUX(X)
SO 4
SIO STRB
SIO CK
PR,709-4A
PR,709-4B
PR,709-4C
PR,709-5A
PR,709-5B
PR,709-5C
PR,709-6A
PR,709-6B
PR,709-6C
PR,709-7A
PR,709-7B
PR,709-7C
PR,709-8A
PR,709-8B
PR,709-8C
PR,709-9A
PR,709-9B
PR,709-9C
PR,709-10B
PR,709-10C
PR,709-11B
PR,709-11C
PR,709-13A
PR,709-13C
CN324,630-4
AD,700-5C
PR,709-13B
AE,405-15B
EQ,401-2C
EQ,401-3C
REC,400-4C
or AE,402-13B
SSP,752-11A
SSP,752-12A
SSP,752-12B
SP,411-10A
SP,411-14B
SP,411-14C

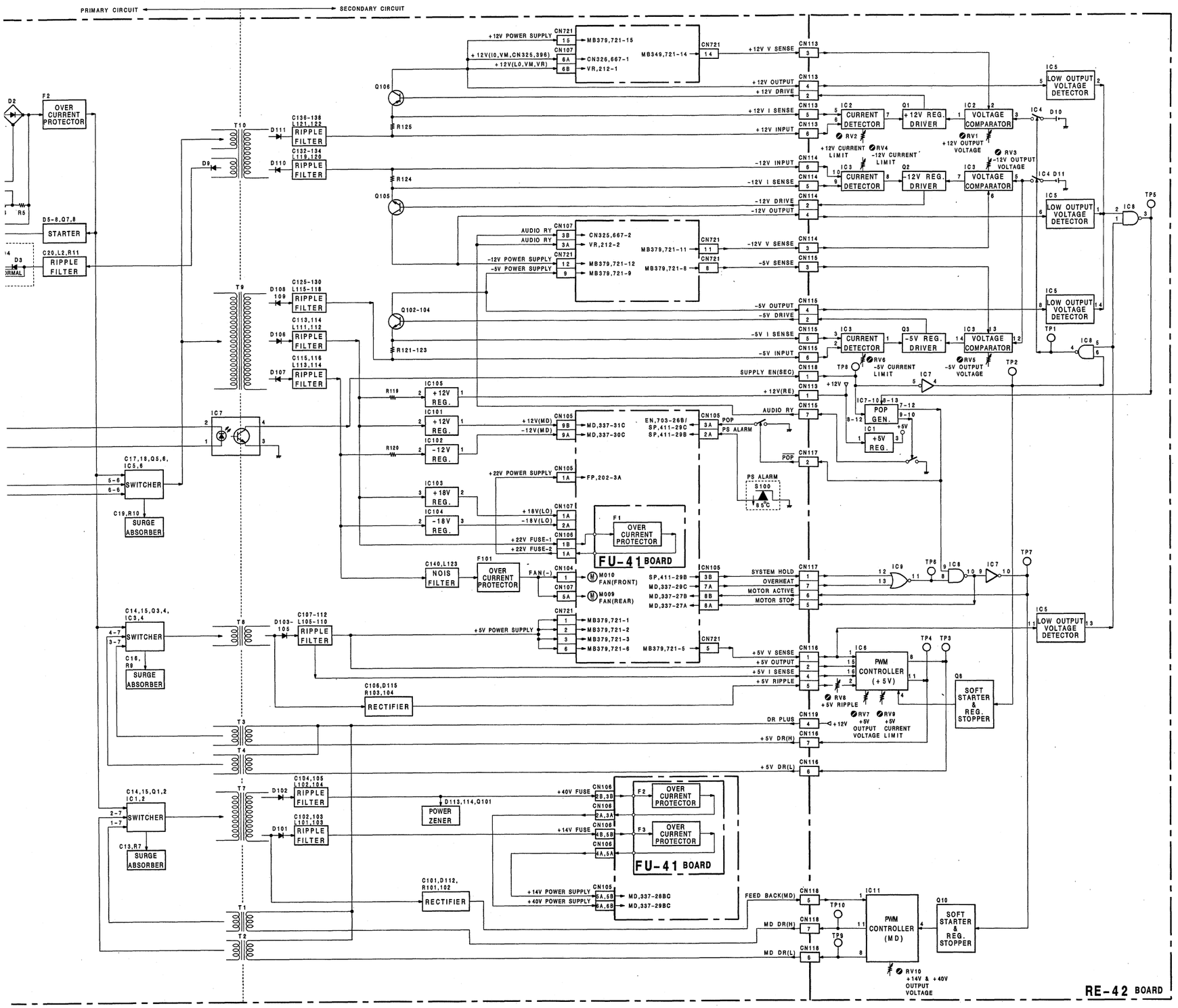


NOTE: [ ] (CONNECTOR'S DESTINATION)
SHOW DVR-28/28P

VM-05 BLOCK DIAGRAM

DVR-20 (J) ;#10001-
DVR-20 (UC) ;#10001-
DVR-20P (EK,UC);#10001-
DVR-28 (J) ;#10001-
DVR-28 (UC) ;#10001-
DVR-28P (EK,UC);#10001-


PRIMARY CIRCUIT
SECONDARY CIRCUIT
FOR J,UC AC IN
FOR EK AC IN
CN101 NOISE FILTER
CB1 BREAKER
S1 POWER ON
CN102
CN103
VDR-1 SURGE ABSORBER
RY2
RY3
RY1
F1,R4 RUSH CURRENT LIMITER
D2
F2 OVER CURRENT PROTECTOR
220-240V
100-120V
VOLTAGE SELECTOR
FLOAT GND
R6
R5
CN109 AC CUT
+12V(PRIM-B) DC VOLTAGE
CN110 PS(PRIM)
CN112 +12V(PRIM) PS(PRIM)
CN110 POWER PULSATION RUSH CURRENT
CN111 SUPPLY EN(PRIM)
CN111 +12V(PRIM-B)
CN112 +12V(PRIM-B)
CN112 PRIM DR(H)
CN112 PRIM DR(L)
D5-8,Q7,8 STARTER
C20,L2,R11 RIPPLE FILTER
START S1 95°C
D4
D3
NORMAL
OVERHEAT PROTECTOR
IC3,7 OVER VOLTAGE DETECTOR
RV1 HIGH VOLTAGE THRESHOLD
IC1,2 R2,3 LINE ACTIVE DETECTOR
IC1 RELAY DRIVER
Q1,2
Q3
IC3 OPERATION DETECTOR
IC2 DELAY
IC8 PWM CONTROLLER (PRIM)
RV2 +22V OUTPUT VOLTAGE
TP1
TP2
TP3
TP4
TP5
IC4
T5
T6
C17,18,Q5,6, IC5,6 SWITCHER
C19,R10 SURGE ABSORBER
C14,15,Q3,4, IC3,4 SWITCHER
C16, R9 SURGE ABSORBER
C14,15,Q1,2 IC1,2 SWITCHER
C13,R7 SURGE ABSORBER
T10
T9
T8
T3
T4
T7
T1
T2
D111
D110
D9
D108 109
D106
D107
D103-105
D102
D101
C136-138 L121,122 RIPPLE FILTER
C132-134 L119,120 RIPPLE FILTER
C125-130 L115-118 RIPPLE FILTER
C119,114 L111,112 RIPPLE FILTER
C115,116 L113,114 RIPPLE FILTER
C107-112 L105-110 RIPPLE FILTER
C104,105 L102,104 RIPPLE FILTER
C102,103 L101,103 RIPPLE FILTER
C106,D115 R103,104 RECTIFIER
C101,D112, R101,102 RECTIFIER
D113,114,Q101 POWER ZENER
IC7
Q106
Q105
Q102-104
R125
R124
R121-123
R119
R120
IC105 +12V REG.
IC101 +12V REG.
IC102 -12V REG.
IC103 +18V REG.
IC104 -18V REG.
C140,L123 NOIS FILTER
F101 OVER CURRENT PROTECTOR
+12V POWER SUPPLY
+12V(I0,VM,CN325,396)
+12V(L0,VM,VR)
MB349,721-14
MB379,721-15
CN326,667-1
VR,212-1
+12V V SENSE
+12V OUTPUT
+12V DRIVE
+12V I SENSE
+12V INPUT
+12V CURRENT LIMIT
-12V INPUT
-12V I SENSE
-12V DRIVE
-12V OUTPUT
AUDIO RY
-12V POWER SUPPLY
-5V POWER SUPPLY
MB379,721-11
MB379,721-12
MB379,721-9
MB379,721-8
CN325,667-2
VR,212-2
-12V V SENSE
-5V SENSE
-5V OUTPUT
-5V DRIVE
-5V I SENSE
-5V INPUT
SUPPLY EN(SEC)
+12V(RE)
+12V(MD)
-12V(MD)
MD,337-31C
MD,337-30C
EN,703-26B/ SP,411-29C SP,411-29B
POP
PS ALARM
PS ALARM S100 85°C
+22V POWER SUPPLY
FP,202-3A
+18V(LO)
-18V(LO)
+22V FUSE-1
+22V FUSE-2
FU-41 BOARD
FAN(-)
M010 FAN(FRONT)
M009 FAN(REAR)
SP,411-29B
MD,337-29C
MD,337-27B
MD,337-27A
SYSTEM HOLD
OVERHEAT
MOTOR ACTIVE
MOTOR STOP
+5V POWER SUPPLY
MB379,721-1
MB379,721-2
MB379,721-3
MB379,721-6
MB379,721-5
+5V V SENSE
+5V OUTPUT
+5V I SENSE
+5V RIPPLE
RV8 +5V RIPPLE
DR PLUS
+12V
+5V DR(H)
+5V DR(L)
+40V FUSE
+14V FUSE
F2 OVER CURRENT PROTECTOR
F3 OVER CURRENT PROTECTOR
FU-41 BOARD
+14V POWER SUPPLY
+40V POWER SUPPLY
MD,337-28BC
MD,337-29BC
FEED BACK(MD)
MD DR(H)
MD DR(L)
TP6
TP8
TP9
TP10
IC2 CUR DETE
IC3 CUR DETE
PS-255 BOARD
CT-133 BOARD



POWER SUPPLY BLOCK DIAGRAM

DVR-20 (J) ;#10001-
DVR-20 (UC);#10001-
DVR-C20(J) ;#10001-
DVR-C20(UC);#10001-
DVR-20P ;#10001-
DVR-C20P ;#10001-

SP00961

SERVICE MANUAL
S E G

SONY

DIGITAL VIDEOCASSETTE RECORDER

DVR-20
DVR-20P
DVR-C20

SUPPLEMENT-2

SUBJECT

Addition and Replacement of Documents

Table of Contents page 2 to 3
SECTION 9 TAPE TRANSPORT SYSTEM ALIGNMENT

APPLICABLE MANUALS/SERIAL NUMBERS

DVR-20 (UC) MAINTENANCE MANUAL (VOL-1)
1st Edition
1st Edition (Revised-1 to Revised-3)
DVR-20P (EK, UC) MAINTENANCE MANUAL (VOL-1)
1st Edition
1st Edition (Revised-1 to Revised-2)
DVR-C20 (UC) MAINTENANCE MANUAL (VOL-1)
1st Edition
1st Edition (Revised-1 to Revised-2)

Above manuals are packed with the following machines.
DVR-20 (UC): #10001 to #11099
DVR-20P (EK): #10001 to #10799
DVR-20P (UC): #10001 to #10399
DVR-C20 (UC): #10001 to #10499

D-2

Composite Digital
MAINTENANCE MANUAL

DVR-20 (UC)
DVR-20P (EK, UC)
DVR-C20 (UC)
9-967-408-03

Sony Corporation
Broadcast Products Group

Printed in Japan
1992. 4 11
© 1992
Published by B&P Marketing Group

SAFETY CHECK-OUT

After correcting the original service problem, perform the following safety checks before releasing the set to the customer:

Check the metal trim, "metallized" knobs, screws, and all other exposed metal parts for AC leakage. Check leakage as described below.

LEAKAGE TEST

The AC leakage from any exposed metal part to earth ground and from all exposed metal parts to any exposed metal part having a return to chassis, must not exceed 3.5mA. Leakage current can be measured by any one of three methods.

1. A commercial leakage tester, such as the Simpson 229 or RCA WT-540A. Follow the manufacturers' instructions to use these instruments.
2. A battery-operated AC milliammeter. The Data Precision 245 digital multimeter is suitable for this job.
3. Measuring the voltage drop across a resistor by means of a VOM or battery-operated AC voltmeter. The "limit" indication is 5.25V so analog meters must have an accurate low-voltage scale. The Simpson 250 and Sanwa SH-63Trd are examples of a passive VOM that is suitable. Nearly all battery operated digital multimeters that have a 20V AC range are suitable. (See Fig. A)

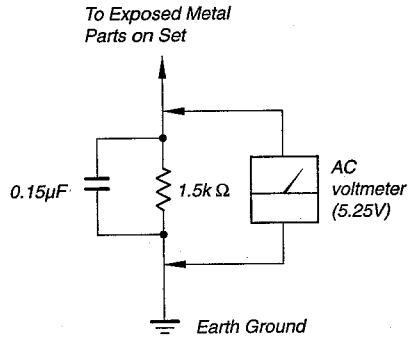


Fig. A. Using an AC voltmeter to check AC leakage.

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15. THEORY OF OPERATION

(Section 10 and 15 will be available as a Supplement.)

Volume-2

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SECTION 9
TAPE TRANSPORT SYSTEM ALIGNMENT

This section describes how to adjust the tape path system.
When the parts that affect the tape path are replaced or when the tape does not run normally, follow this section to locate the source of the trouble and to remedy it.

Cautions Before starting Tape Path System Alignment

Followings are the particular cautions to be observed in the tape path system adjustment.
Be sure to read through them before performing the adjustment.

1. Tape path system alignment

This alignment consists of three adjustments as follows.

1) Tracking Adjustment
   - Tracking adjustment (linearity)
   - Stationary R/P head azimuth adjustment
   - Stationary R/P head height adjustment
   - Stationary CONFIDENCE head height adjustment
   - CTL head position adjustment
   - PG (drum PG) phase adjustment
2) Self record/playback RF envelope waveform check
3) Tape path adjustment

   Cautions in each adjustments are described as follows.

2. Cautions in the tape path system alignment

The Alignment tape to be used;

> The Alignment tape for tracking adjustments on this unit is ER2-2. Do not use ER2-1 as accurate adjustments cannot be performed.
> ER2-2 Sony Part No.:8-960-071-12

1) [Tracking Adjustment]

(1) Tracking adjustment (linearity)

Purpose of the tracking adjustment is to make the rotary head trace the track correctly and to get the best tape-to-rotary head contact. (See Fig. 9-1, which shows the tape pattern of D-2 format.)

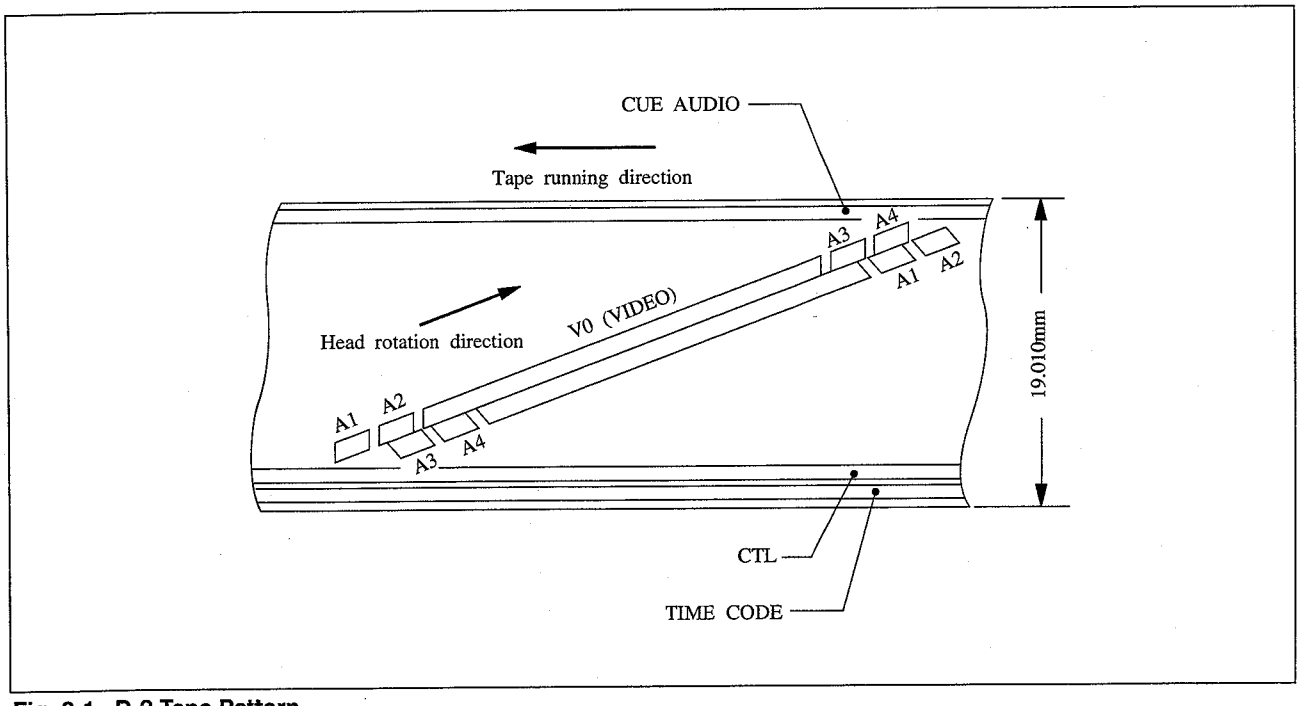


Fig. 9-1. D-2 Tape Pattern

This adjustment is performed by adjusting the four guides (S1, S2, T1, T2) on the slider base at the tape entrance/exit side of the drum, while playing back the ER2-2 and observing the RF envelope. (See Fig. 9-2.)

Adjusting these guides has a great effect on the tracking adjustment of the RF envelope at the tape entrance/exit side shown in marked ◌ portions of Fig. 9-2.
Also, the marked ◌ portions are assigned for the digital audio tracks (A1 to A4ch) shown in Fig. 9-1. If these guides are incorrectly adjusted, audio interchangeability becomes poor.

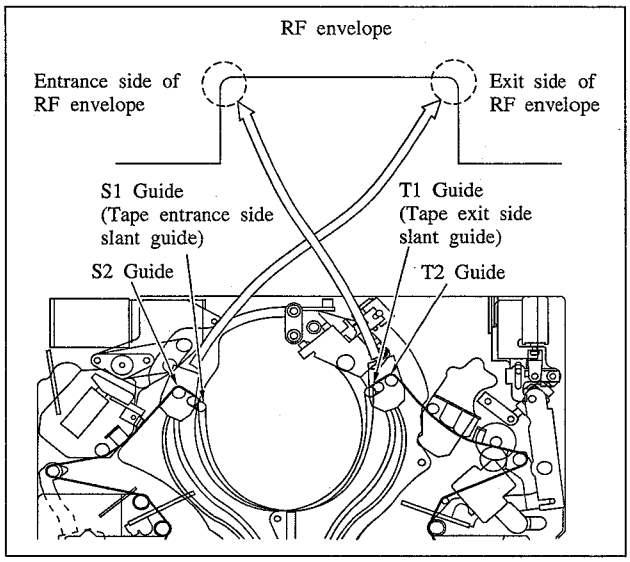


Fig. 9-2. RF Envelope Adjustment

ER2-2 is the Alignment tape for tracking adjustment. For this purpose low frequency is recorded on the tape, to avoid a poor RF envelope caused by spacing loss.
The RF envelope can be made flat by the guide adjustment, which follows the same straightness of the ER2-2. This results that the straightness adjustment has properly been made.

Be sure to use 0 - 15min portion of ER2-2 for adjusting the guides.
Use 15 - 20min portion for adjusting the CTL position and the PG phase.

Also, there is the case in which the RF envelope in self record/playback is worse than the one obtained by playing back the ER2-2. (See Fig. 9-3.)
This means that the RF envelope becomes poor due to spacing loss caused by the high frequency recorded.

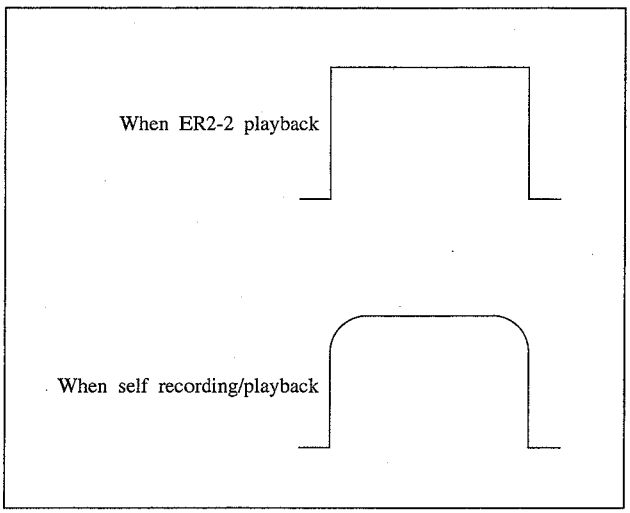


Fig. 9-3. Self Record/Playback RF Envelope

As observing the above described phenomenon, and if the guide adjustments are attempted to improve the self record/playback RF envelope in the self record/playback mode, the result will be the tracking error at the entrance/exit side as shown in Fig. 9-4.
***This causes loss of interchangeability of the recorded tape.**

Therefore, never ignore the RF envelope of the alignment tape.

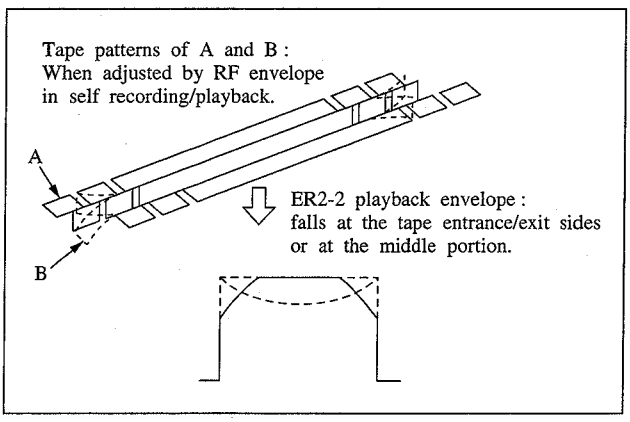


Fig. 9-4. Self Record/Playback Tape Pattern

(2) Following problems will be resulted when tracking adjustment is incorrect

① In case that S2, T2 guides height adjustment is NG

Basically, S2, T2 guides are for adjusting the tracking (linearity) at the entrance/exit side of ER2-2 RF envelope . (See Fig. 9-2)

As seen in Fig. 9-5, audio sectors are placed at both edges of the helical track in D-2 format, and correspond to the entrance and exit side of the RF envelope.
Bad adjustment of the T2 guides height results in tracking error shown in Fig. 9-6 when editing the digital audio, such as audio insert editing. And the shape of RF envelopes changes between inserted portion and recorded portion. This makes audio error rate bad.

In adjusting the S2/T2 guides height, be sure to use ER2-2 and be careful not to lift the tape upward or giving too much downward pressure.

② In case the S1 guide (slant guide) adjustment is NG

The S1 guide should be adjusted to minimize a fluctuation at the exit side (tape entrance side) of the RF envelope as shown in Fig. 9-7 and to make good contact between the tape and drum rabbet guide. The S1 guide has no guide flange which controls tape running and is adjusted by changing the slant of the guide.
The S1 guide should be adjusted to stretch the lower part of the tape.

If the S1 guide slant adjustment is no good, a tracking error occurs due to the fluctuation at the exit side of RF envelope, and the specification of digital audio becomes worse.

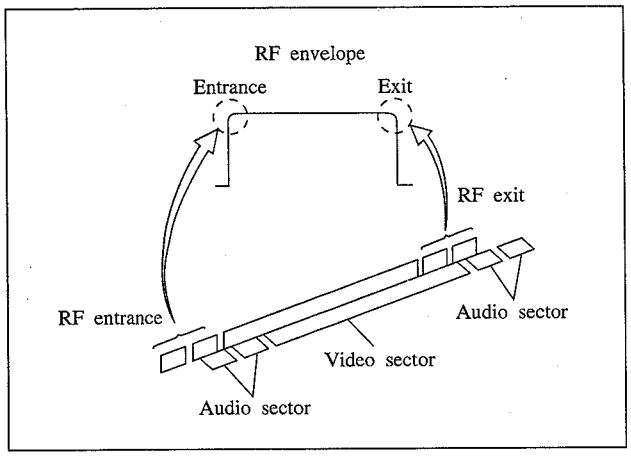


Fig. 9-5. Audio Sectors Placement

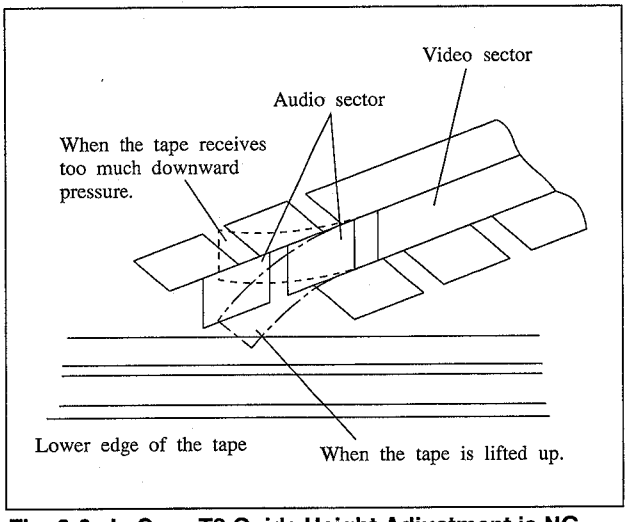


Fig. 9-6. In Case T2 Guide Height Adjustment is NG

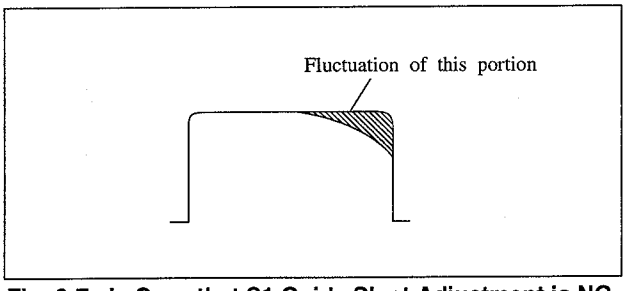


Fig. 9-7. In Case that S1 Guide Slant Adjustment is NG

③ In case the T1 guide (slant guide) adjustment is NG

As well as the S1 guide, the T1 guide has no guide flange which controls tape running. This guide is adjusted by changing the slantness in order to minimize the fluctuations at the entrance side of the RF envelope as shown in Fig. 9-8.

Like the S1 guide, the T1 guide is adjusted by changing the slantness of the guide.

The slant of the T1 guide is adjusted to stretch the lower section of the tape (lower protrusion).

If this guide adjustment is no good, a tracking error occurs due to the fluctuation at the entrance side of the RF envelope, and the performance of digital audio becomes worse.

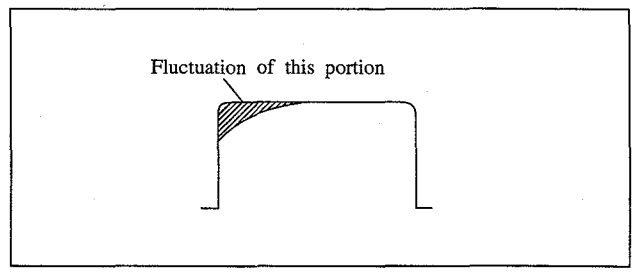


Fig. 9-8. In Case T1 Guide Adjustment is NG (1)

④ In case the Stationary R/P head height adjustment is NG

This adjustment determines the height of the longitudinal tracks (CUE, CTL and TIME CODE) as shown in Fig. 9-9.

If this adjustment is no good, a tracking error occurs as shown by the dotted line in Fig. 9-9.

If the tape is recorded in such condition, the interchangeability for playback by other VTRs is not guaranteed.

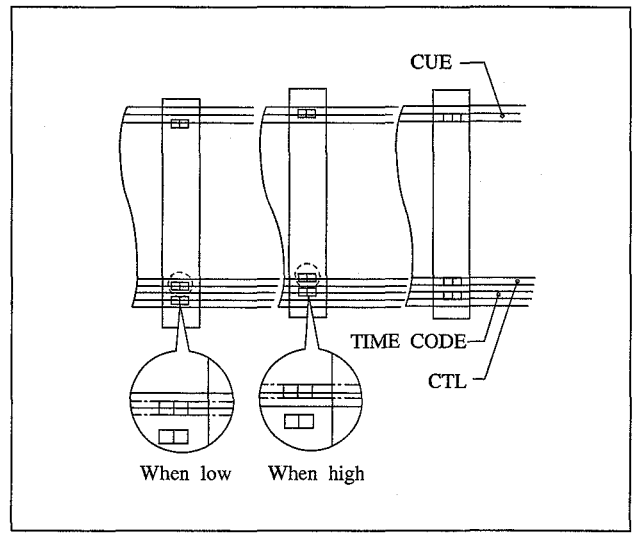


Fig. 9-9. In Case the Stationary Head Height Adjustment is NG

⑤ Unsatisfactory Stationary R/P Head Azimuth Adjustment

This adjustment determines slantness of the head in respect to the tape.

If this adjustment is imperfect, in some cases, azimuth loss will occur and the output of each track will decrease excessively.
Although the height is adjusted using the CTL as reference in step ④, the height of the CUE track becomes low as the head begins to slant. When this happens, there can be the cases where the VIDEO DATA section may be erased by the CUE track ERASE head.

⑥ Stationary CTL, T/C CONFIDENCE Head Height Adjustment

If this adjustment is imperfect, the CTL or T/C recording error will occur during recording, and a warning will be given.

⑦ In case the CTL head position adjustment is NG

This adjustment is made in order to match the relative relation (distance) of CTL HEAD STAC versus PROGRAM DATA in the longitudinal direction of the tape.

Error rate of audio or video may be high when inserting in the poor CTL position. For example, in the digital audio editing as shown in Fig. 9-10, when the A3/A4 chs. are inserted on a tape on which the A1/A2 chs. are already recorded, part of the A1/A2 chs. tracks are erased.
Therefore, the tracks will become narrow, and the resulting error rate becomes worse.

Therefore, this adjustment is important in order to secure tape format. Always perform the adjustment using ER2-2 (TC 15 to 20 min portion).

Note: After adjustment of the CTL head position, be sure to check the PG phase.

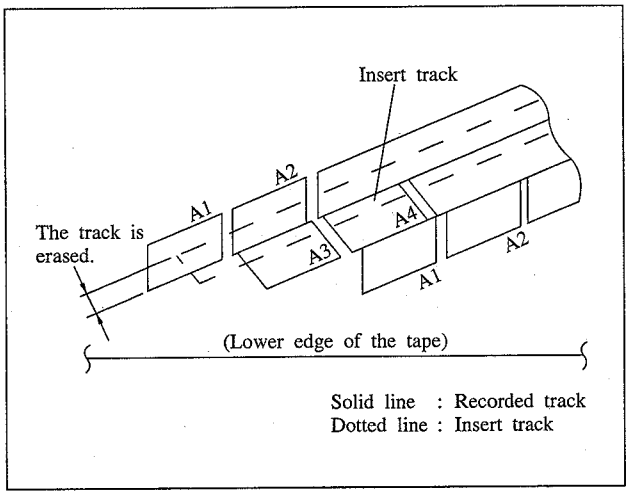


Fig. 9-10. In Case the CTL Head Position Adjustment is NG

⑧ In case PG phase adjustment is NG

As shown in Fig. 9-1 1 track of the D2 tape format is divided into 5 sectors.
- Digital audio sector:A1, A2, A3, A4
- Digital video sector:V0

Each sector can be insert-edited separately.
So, there are edit-gaps between each sector as shown in Fig. 9-11 and signals can not interfere with each other.

However, if the PG phase adjustment is no good, the recording start point on the helical track will be shifted.

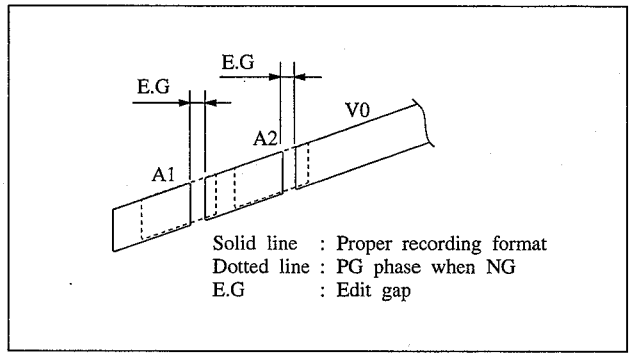


Fig. 9-11. In Case PG Phase Adjustment is NG

For example, if A1/A2 chs is insert-edited, the recording portion on the audio sector is shifted to the video sector and results in a part of the video sector being erased and the error rate becoming worse.

The edit gap between each sector is 19.4 μsec. But considering the interchangeability between tapes and the changes of the tape due to the elapse of time, it is determined that the specification of PG phase is 0±1 μsec.

Therefore, this adjustment is important in order to guarantee the tape format. Always perform the adjustment using ER2-2 (TC 15 to 20 min).

Note: After adjustment of the PG phase there is a case that the CTL position changed accordingly. Be sure to check the CTL head position. (Confirm that the center of the RF envelope is maximum when the TRACKING is set to FIX.)

2) [Self record/playback RF envelope check]

- In recording or playing back the tape, a spacing loss between the tape and rotary head occurs. The causes of spacing loss are complicatedly related to air film, change of tape path, tape tension, tape stiffness, head shape and head projection.
  Perform the self recording/playback envelope check to confirm that the recorded tape is usable practically without problem even with a spacing loss.

- As explained in the Tracking adjustment, a low frequency signal is used for RF envelope recording in the ER2-2. On the other hand, in the self recording/playback, a high frequency signal is recorded, so the RF envelope of self recording/playback looks worse than that of ER2-2 (Refer to Fig. 9-3)
  However, never adjust the tracking by observing the self recording/playback RF envelope to make it better, while disregarding the adjusted tracking of the RF envelope of ER2-2.
  ***The interchangeability among recorded tapes will be lost.**

- Countermeasure in case the self recording/playback RF envelope is NG.
  * The RF envelope may differ slightly in shape using tapes from different manufacturers.
  If it is still no good after the following countermeasures are performed, replace the tape and recheck.

(1) In case the RF envelope at the entrance side is very low. (See Fig. 9-12)

[Check procedure]

① Be sure to playback ER2-2 (TC 15 to 20 min portion) to confirm that the T1, T2 guides are adjusted correctly. This case is caused when the T2 guide height has been set too low.
↓

② If there is no problem with the T1, T2 guides adjustment, proceed then to a head projection check. If the head projection is 30 μm or less, replace the middle drum.
↓

③ If there is no problem with the T1, T2 guides adjustment or head projection, use it subject to that the error rate is no problem.
Even if the RF level becomes around 50%, there may be the case that error rate has no problem.

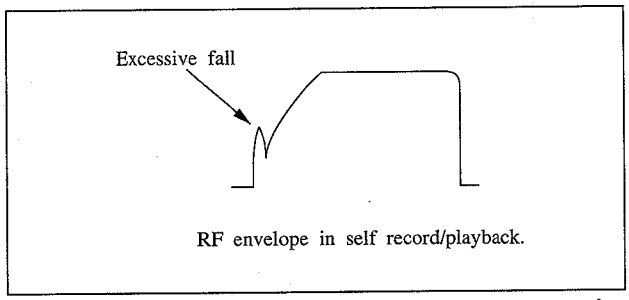


Fig. 9-12. The Level of the Envelope is Down at the Entrance Side

*** How to check the error rate**

There are two ways to check the error rate. One is by using the channel condition which is displayed on the control panel. The other is using the TP (test point) on DE board which can show the error condition corresponding to the drop of RF envelope level. They are useful in checking whether a reduced level of the RF envelope has any influence on the error rate.

DE board TP1 : A/Cch error
TP2 : B/Dch error

Oscilloscope
CH1 : OUTPUT of WFM on the rear panel
WFM setting if VIDEO OUT menu :
ENV A/C or ENV B/D
CH2 : TP 1 or TP 2 on the DE board

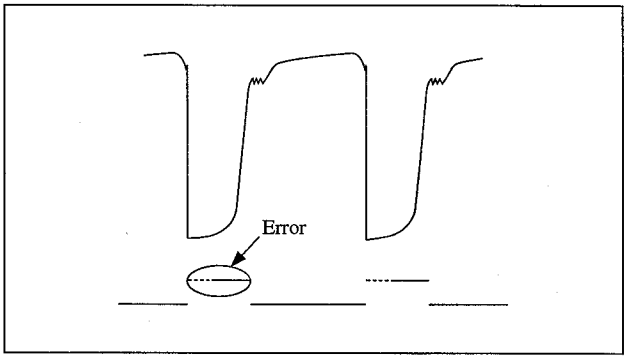


Fig. 9-13. Error Rate Check

(2) In case the RF envelope at the exit side is very low. (See Fig. 9-14.)

[Check procedure]

① Be sure to check the S1 and S2 guide height by playing back ER2-2 (TC 15 to 20 min).
If the S2 guide is set too low, this symptom appears.
↓

② If the S1 and S2 guides check shows no problem in the mechanism, check the head projection amount.
It is recommended that the middle drum be replaced if the amount of head projection is below 30 um.
↓

③ If the result of the S1 and S2 guides check and the head projection amount are satisfactory, check the error rate. If there is no problem, continue use.
There may be no problem with the error rate even if the amount of drop is 50%.

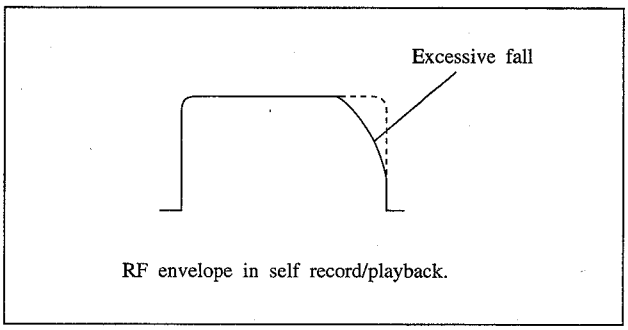


Fig. 9-14. The Level of the Envelope is Down at the Exit Side

3) [Tape path adjustment]

The tape path adjustment is carried out by adjusting the height of each guide as shown in Fig. 9-15.
The basic idea of this adjustment is to make the tape run from S side (Supply side) reel to T side (Take-up side) reel, so that tape receives no damage.
Commercially available cassette tapes without damage in the edge can be used in this adjustment.

Cautions in tape path adjustment are as follows.

- **Procedure**
  Perform the adjustment sequence according to procedures 1 though 3 in Fig. 9-15.

- **Caution**
  1) NEVER adjust the S4 guide because it is the reference guide for the tape path system. If it is replaced or its height was changed by mistake, be sure to adjust the height of S4 guide using the following jigs.
     - S4 Guide Width Adjustment Jig
       For DVR-10/20
       (Commonly used in both models)
       CONFI head adjustment plate
       SONY Part No. J-6257-140-A
     - Guide Height Adjustment Jig
       For DVR-10/20
       Master block (S3)
       SONY Part No. J-6253-340-A

  2) Confirm the tape path in each modes of PLAY and VAR (-1).
     Basically, adjust the portion only where tape run shows the trouble. After the adjustment, be sure to perform the tape path check and the tracking check.

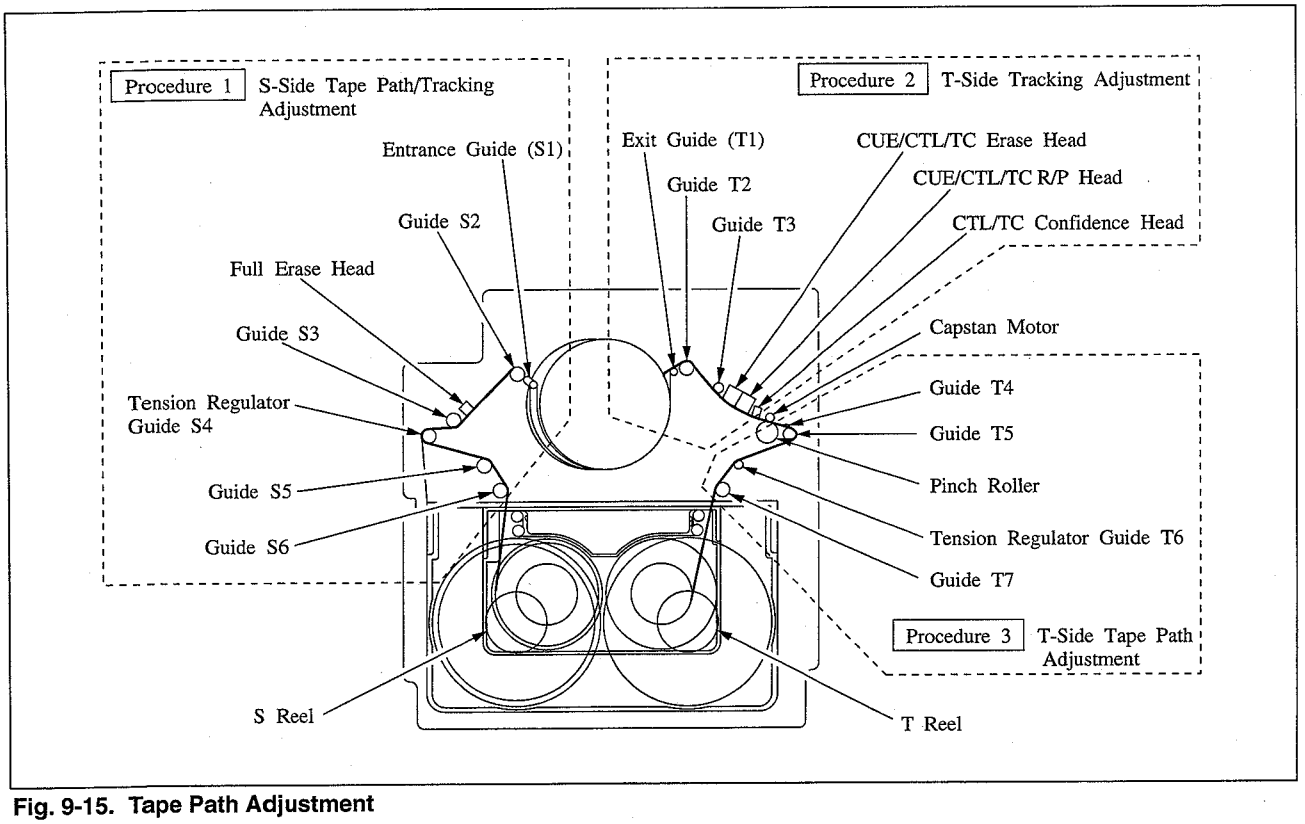


Fig. 9-15. Tape Path Adjustment

9-1. OUTLINE

This section describes how to adjust the tape path system of the DVR-20 series.
Tape path adjustment consists of following three procedures. Each procedure can be identified by the block shown in Fig. 9-16. Tape path alignment should be carried out in the order of Procedure 1, Procedure 2 and Procedure 3.

Procedure 1: S-side Tape Path/Tracking Adjustment
Procedure 2: T-side Tracking Adjustment
Procedure 3: T-side Tape Path Adjustment

- Appendixes are attached at the end of this section.
  Especially, Appendix 1, Appendix 2 and Appendix 3 are the quick references for the tape path alignment.
  Appendix 1.Flowchart for Tape Path Alignment
  Appendix 2.Tape Path Check Quick Reference
  Appendix 3.S1/S2/T1/T2 Guide Adjustment Quick Reference
  Appendix 4.Quick Check for Tracking
  Appendix 5.How to Use Cleaning Cassette
  1: Head clogging check
  2: Channel condition check
  3: Envelope waveform check
  Appendix 6.S and T Reel Tables Height Adjustment

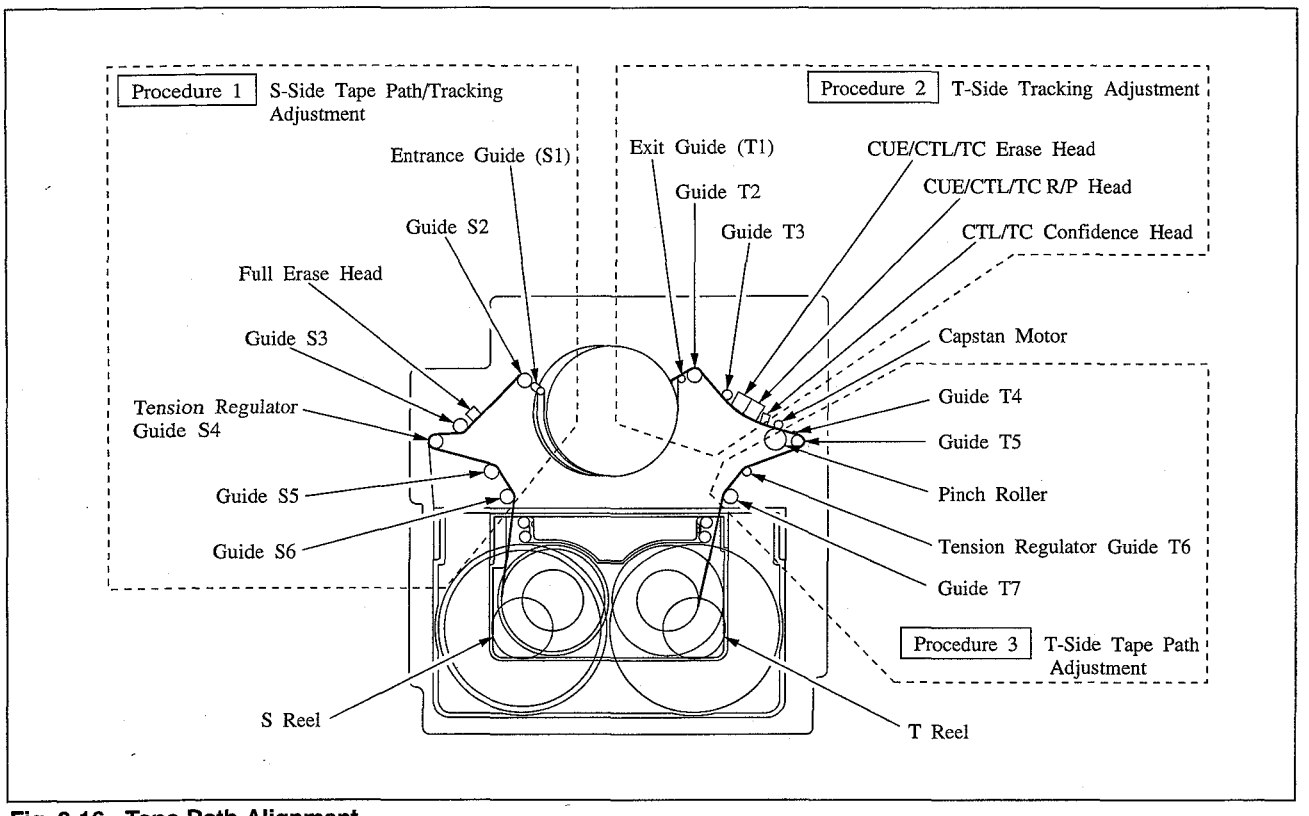
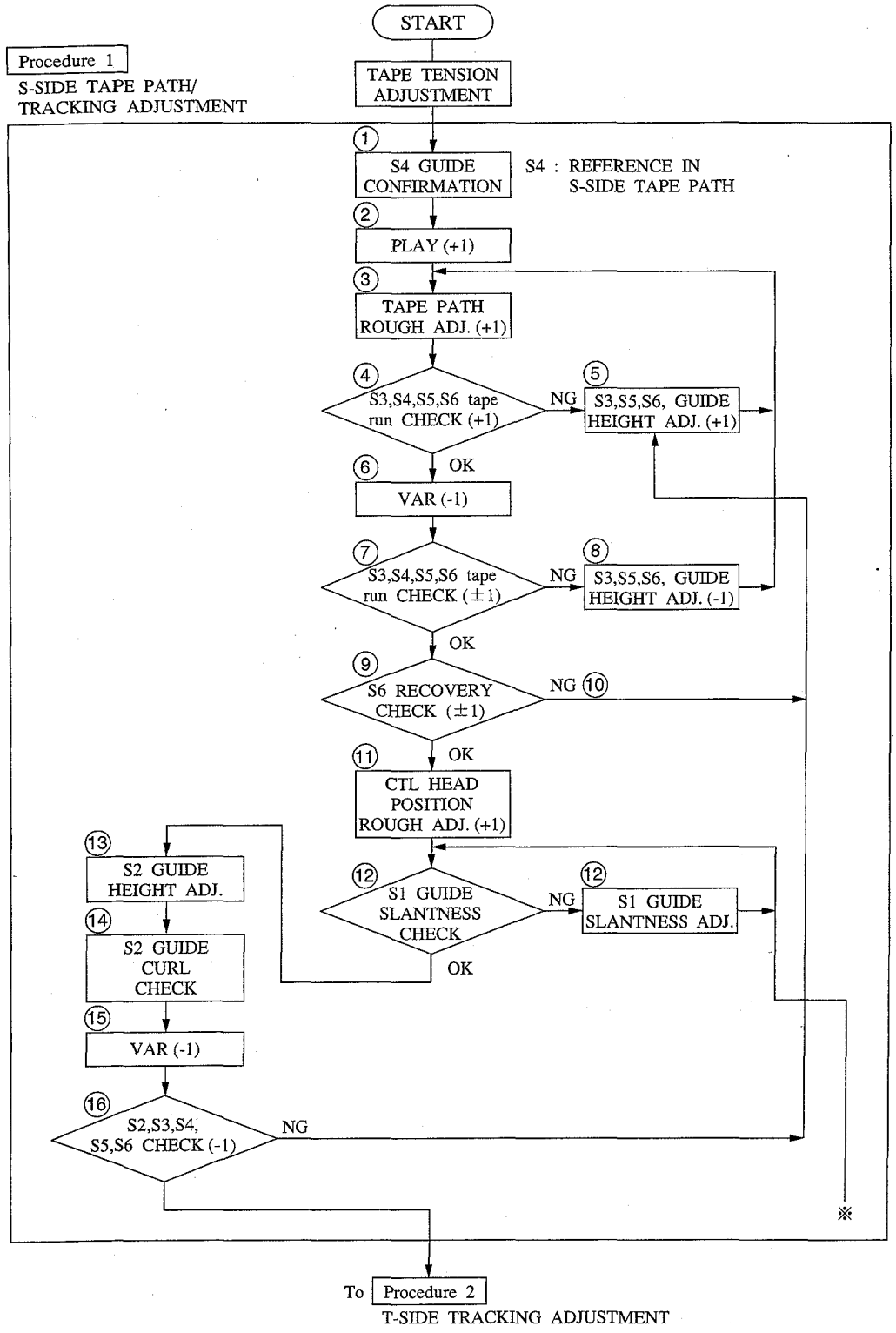
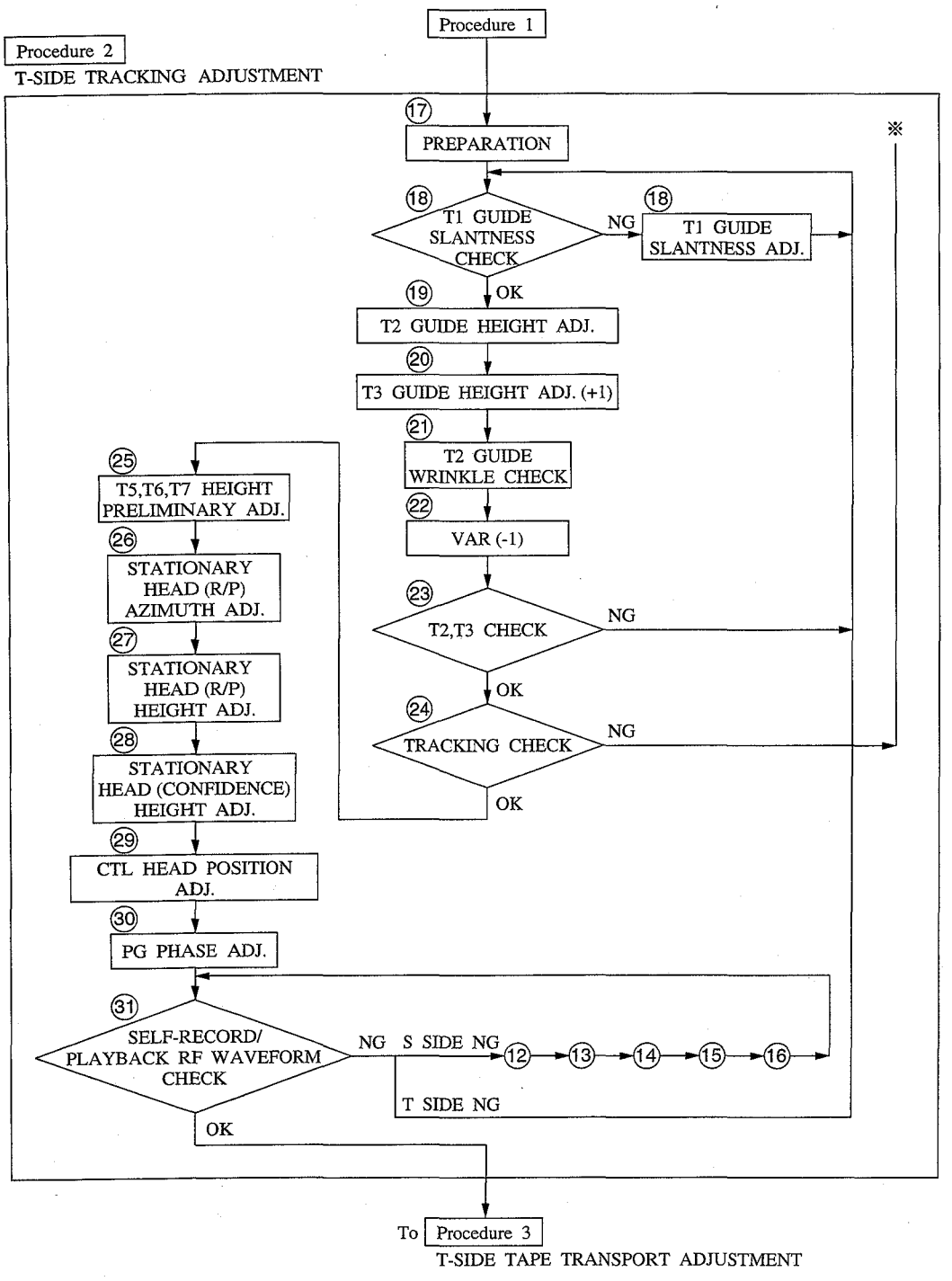


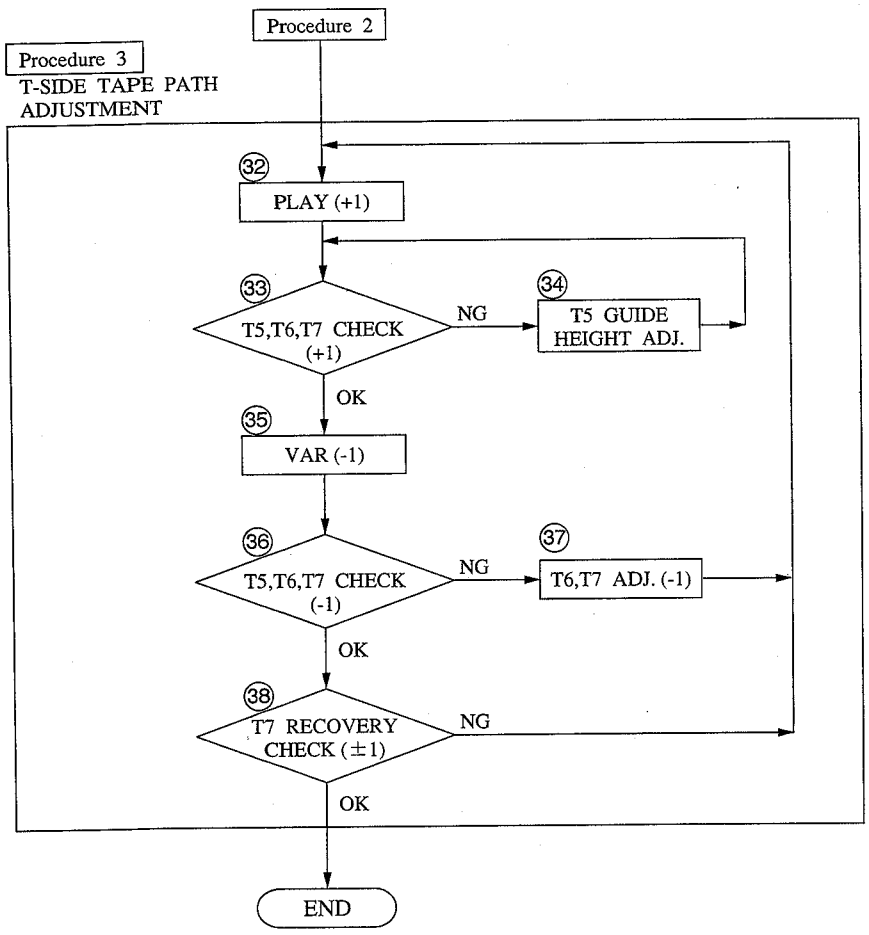
Fig. 9-16. Tape Path Alignment

9-2. FLOWCHART FOR TAPE PATH SYSTEM Alignment (DETAILED DESCRIPTION)

Note: Numbers inside flowchart correspond to each adjustment Pro-cedure.




Procedure 1
Procedure 2
T-SIDE TRACKING ADJUSTMENT
17
PREPARATION
※
18
T1 GUIDE SLANTNESS CHECK
NG
18
T1 GUIDE SLANTNESS ADJ.
OK
19
T2 GUIDE HEIGHT ADJ.
20
T3 GUIDE HEIGHT ADJ. (+1)
21
T2 GUIDE WRINKLE CHECK
22
VAR (-1)
23
T2,T3 CHECK
NG
OK
24
TRACKING CHECK
NG
OK
25
T5,T6,T7 HEIGHT PRELIMINARY ADJ.
26
STATIONARY HEAD (R/P) AZIMUTH ADJ.
27
STATIONARY HEAD (R/P) HEIGHT ADJ.
28
STATIONARY HEAD (CONFIDENCE) HEIGHT ADJ.
29
CTL HEAD POSITION ADJ.
30
PG PHASE ADJ.
31
SELF-RECORD/ PLAYBACK RF WAVEFORM CHECK
NG
S SIDE NG
12
13
14
15
16
T SIDE NG
OK
To
Procedure 3
T-SIDE TAPE TRANSPORT ADJUSTMENT


Procedure 2
Procedure 3
T-SIDE TAPE PATH
ADJUSTMENT
32
PLAY (+1)
33
T5,T6,T7 CHECK
(+1)
NG
34
T5 GUIDE
HEIGHT ADJ.
OK
35
VAR (-1)
36
T5,T6,T7 CHECK
(-1)
NG
37
T6,T7 ADJ. (-1)
OK
38
T7 RECOVERY
CHECK (±1)
NG
OK
END

9-3. TAPE PATH ADJUSTMENT/TRACKING ADJUSTMENT

9-3-1. PRELIMINARY INFORMATION

A. Each guide is lowered by turning the flange clockwise, and is raised by turning the flange counterclockwise. When turning the flange by one turn (360°), height changes by 0.5mm.

B. After the completion of each guide height adjustment, be sure to tighten the setscrews. Tightening torque is 34.3 N·cm (3.5 kgf·cm) for S4 and 58.8 N·cm (6 kgf·cm) for others. After tightening the setscrews, check the position of guide. If changed, perform readjust-ment.

C. After the completion of all adjustment, apply a coat of screwlock to the following screws:

(Setscrew of each guide, S1/T1 slant adjustment screw, fixed (R/P) head height adjustment screw, CTL head position fixed screw, fixed R/P head azimuth adjustment screw and CONFIDENCE head height adjustment screw)

D. Letters (+1), (-1) or (+-1) at the side of the title shows to perform in PLAY (+1), VAR (-1) or PLAY (+1)/VAR (-1).

E. In case the drum assembly has been replaced, be sure to put the unit into the REC mode for about 20 minutes using a commercially available tape, before performing the tracking check.

F. If the guide adjustment is made, do not curl the tape around the guide and then release it slowly.
In the DVR-20 series, its structure is designed so that tape curls are not easily made. If this adjustment method is used, the tape edge is excessively held by the flange. As a result, it might cause damage to the tape edge.

9-3-2. PROCEDURE 1
S-Side, Tape Path/Tracking Adjustment

Preliminary Information

1. Wrinkles and curls around the S4, S5, and S6 guides must be removed by adjusting the S5 guide. (Since the S4 guide is a reference guide, this guide should not be adjusted,) Since curls hardly occur around the S6 guide, avoid adjusting this guide as much as possible. Only in cases when wrinkles and curls cannot be removed by using the S5 guide should the S6 guide be adjusted.
In this case, however, the S6 guid must not be adjusted by more than ±90° after the adjustment is made accurately using a jig.
2. Refer to Fig. 9-17 for each guide height adjustment

① S4 Guide Height Adjustment

Do not adjust the S4 guide. The S4 guide is the reference guide for the guide height adjustment.
When S4 guide is replaced or if height of S4 should be changed by mistake or there is a possibility to be changed the height of S4 guide, be sure to adjust the height of S4 guide using Maintenance Tool.
(Refer to "S4 Guide Height Adjustment" of Maintenance Manual Vol 1.)
If S-side tape path can not be adjusted by performing following procedures, check/adjustment again the height of S4 guide using Maintenance Tool.
Do not adjust the S4 guide after making these adjustments.

② Playback (+1)

Playback a commercially available tape of no damage along the edge.

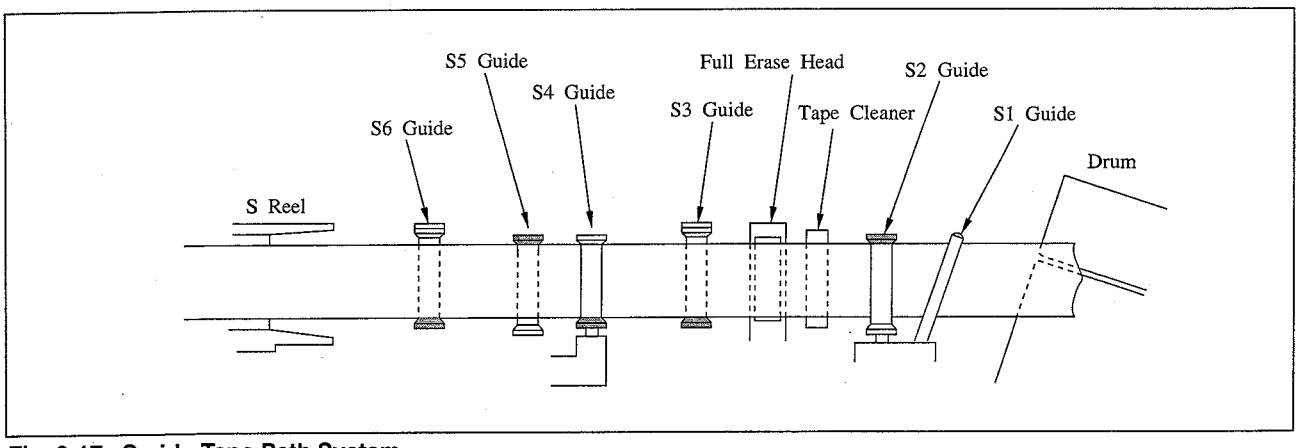


Fig. 9-17. S-side Tape Path System

③ Tape Path Rough Adjustment (+1)

Check the S side and T side tape guides. If any guide produces such a wrinkle or a curl that may damage a tape, make the wrinkle or the curl smaller by turning the flange of the guide which causes it in the sequence of S6 through S1 (excluding S4) and T1 through T7 (in the tape running direction).
(See Fig. 9-18)

Do not adjust the S4 guide because it is reference guide. If there is remarkable curl or wrinkle around the S4 guide, minimize them by turning S5 and S6 guides.

Confirm that the tape does not touch with the both S and T reel flanges while running. When the tape touches with the reel flange, adjust the reel table height according to APPENDIX 6.

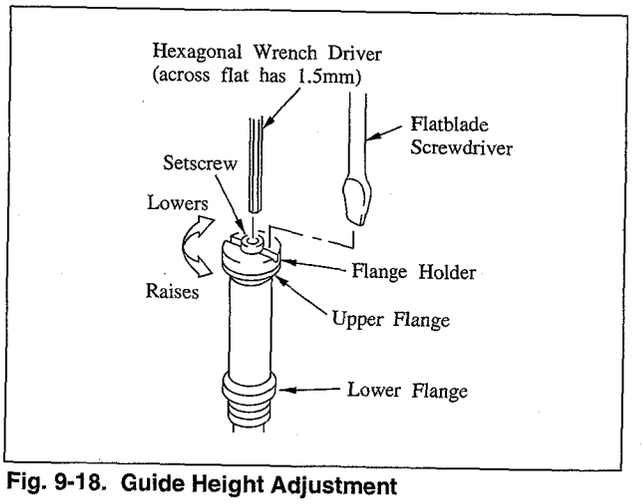


Fig. 9-18. Guide Height Adjustment

④ S3, S4, S5 and S6 Guides Tape Path Check (+1)

S3, S4 Guides

•••Check that there is no curl or wrinkle.

S5, S6 Guide

•••As shown in Fig. 9-20 (a), it is OK when a very small curl appears at the side of the flange without causing the tape damage. (However, perform adjustment to minimize the curl or wrinkle.)
As shown in Fig. 9-20 (b), it is NG when the tape is folded at the flange, in other words, tape runs over the flange.

Note: Since S6 guide uses a barrel-shaped type roller, a wrinkle around the middle of tape due to a barrel-shaped type is OK. However, the wrinkle caused by too much pressure upon tape edge with flange is NG and should be remedied.

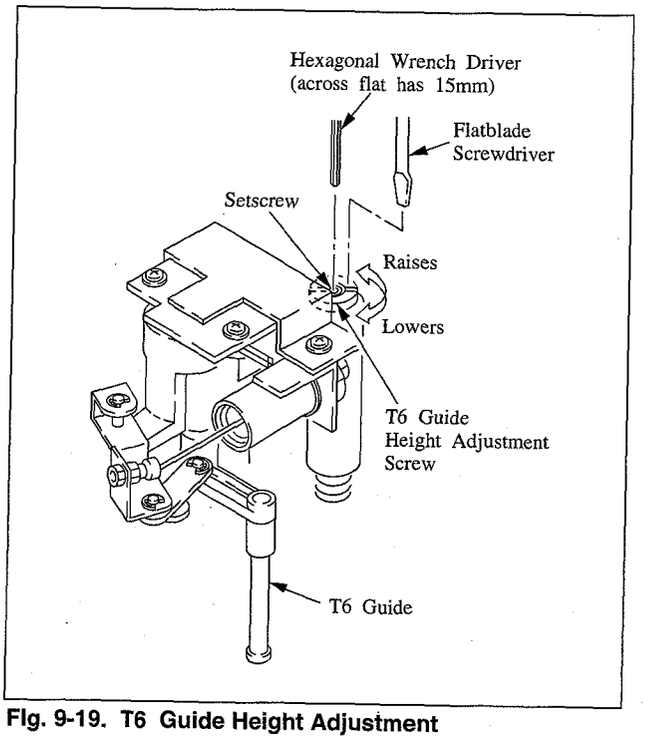


Fig. 9-19. T6 Guide Height Adjustment

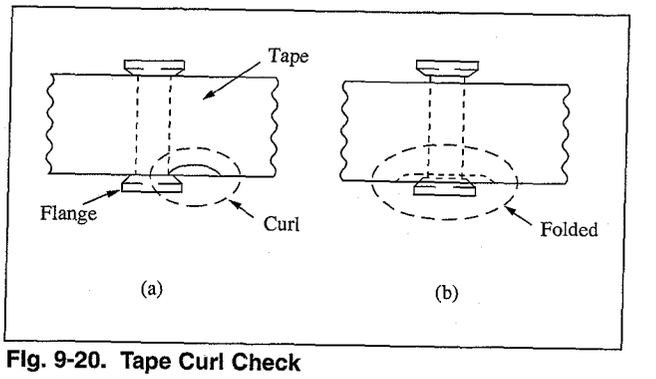


Fig. 9-20. Tape Curl Check

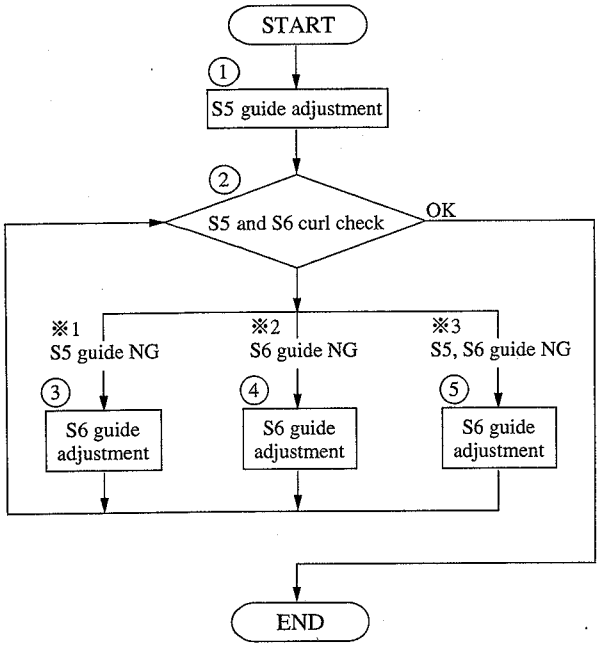
⑤ S3, S5 and S6 Guides Height Adjustment (+1)

(i) In case when there is wrinkle or curl at S4 guide

Note: Do not adjust S4 guide because it is reference guide.

1) Adjust the S5 and S6 guides according to the following flowchart.

Note: If the S6 guide is adjusted, the S6 guide must not be adjusted by more than ±90° after the adjstment is made using a jig.



① move the S5 guide to remove the wrinkles and curls around the S4 guide.
② Check to see whether or not the S5 and S6 guides have curls. If there are no curls, execute the steps after 2).
③ In this case, the S6 guide adjustment is made to remove curls around the S5 guide.
④ In this case, the S6 guide adjustment is made to remove curls around the S6 guide.
⑤ In this case, the S6 guide adjustment is made to remove curls around the S5 and S6 guides.

2) If the result is still NG after 4), dismount the S6 guide roller and mount it in the upside-down direction or replace it with a new roller and repeat 1) - 3).
3) Raise the S3 guide so that lower edge of tape is in contact with the lower flange.

(ii) In case that the S4 guide is OK but there is wrinkle or curl at S5 and S6 guides

Start adjustments from ※1 - ※3 of the flowchart shown in 1) of (i) and then perform 2) and 3).

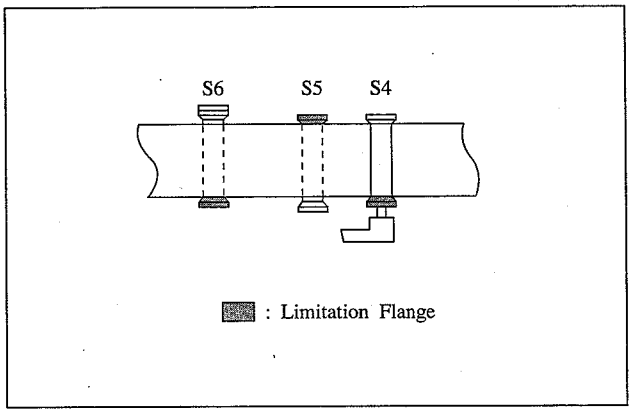


Fig. 9-21. Limitation Flange

⑥ Set the equipment into VAR (-1) mode from PLAY (+1) mode

⑦ S3, S4, S5 and S6 Guides Tape Path Check (-1)

S3, S4, S5 and S6 Guides

••• As shown in Fig. 9-19 (a), it is OK when a very small curl appears at the side of the flange without causing the tape damage. However, perform adjustment to minimize the curl or wrinkle.
As shown in Fig. 9-19 (b), it is NG when the tape is folded at the flange, in other words, tape runs over the flange.

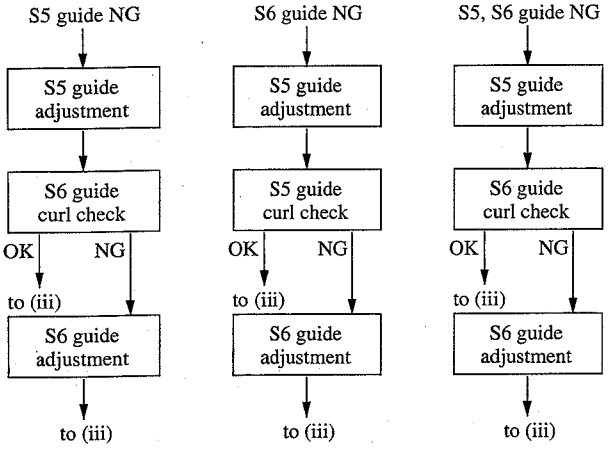
Note: Since S6 guide uses a barrel-shaped type roller, a wrinkle around the middle of tape due to a barrel-shaped type is OK. However, the wrinkle caused by too much pressure upon tape edge with flauge is NG and should be ignored.

⑧ S3, S5 and S6 Guides Height Adjustment (-1)

(i) If tape wrinkles or curls at S3 and S4, decrease the wrinkle or the curl by adjusting the S3 guide.
Do not adjust the S4 guide.

(ii) If the S5 or S6 guide has wrinkles or curls, adjust the S5 and S6 guides according to the following table.

Note: If the S6 guide is adjusted, it must not be adjusted by more than ±90° after the adjustment is made using a jig.



(iii) After making an adjustment, take the step ④ procedure for checking.

⑨ S6 Guide Recovery Check (+-1)

Note: Be sure to perform recovery check in both PLAY (+1) and VAR (-1) modes.

Push the upper portion and bottom portion of the S6 guide roller from the opposite side of the tape contacting side with bamboo stick as shown in Fig. 9-22 and fold the tape, in other words, runs the tape over the flange. In this case, the tape is folded at the lower flange. Then check that the tape is recovered form folding in 1 or 2 seconds after releasing bamboo stick.
When pushing the upper potion (a), tape is folded at the lower flange. In a same manner, check when pushing lower portion (b) of the S6 guide roller. In this case tape is folded at the upper flange.
S5 and S6 guides height adjustment is completed when recovery check shows OK. Perform step ⑪ and the latter.

⑩ S5 and S6 Guides Height Adjustment (+1)

If the result of a recovery check is NG, repeat from the step ⑤. However, pay attention to the following.
If the S6 guide roller was dismounted and mounted again in the upside-down direction in the step ⑤ (or ⑧), replace the S6 guide roller with a new roller.

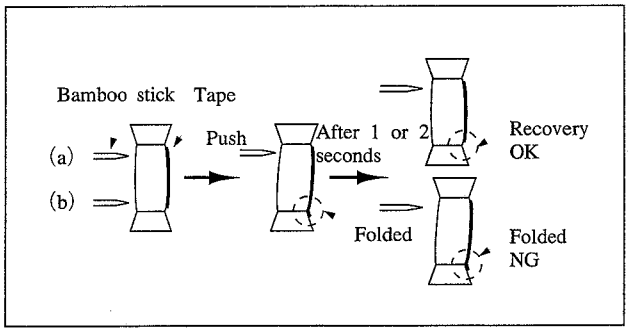


Fig. 9-22. Tape Recovery Check

⑪ CTL Head Position Rough Adjustment (+1)

Playback an alignment tape ER2-2. If the CTL head position is greatly shifted, roughly adjust the CTL head position before-hand.

1) Connect TP101 (REC CH-A OUT) on REC-11 board to CH-1 of oscilloscope and TP19 (CTL OUT) on AE board to CH-2 of oscilloscope. Then, connect CF PULSE OUT (BNC connector) on the connector panel to the oscilloscope as a trigger input.

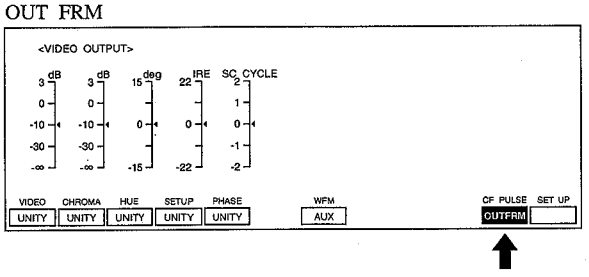
   Note that REC, CH-A OUT can be taken out also from WFM OUT by the following procedure.
   BKDV-101: Set WFM to "AUX" by pressing the [VIDEO OUT] key on the control panel.

   BKDV-200/201: Press SET key on the control panel.

2) Set the display of CF PULSE to "OUT FRM" by the following procedure.
   BKDV-101: Press the [VIDEO OUT] key on the control panel. Set CF PULSE display to "OUT FRM" by pressing the [F11] key. (Fig. 9-23.1)
   BKDV-200/201: Press the [SET UP] key on the control panel. Select 209 [CF PULSE SELECT] by turning the JOG DIAL. After pressing the [>] key, keep pressing the [^] key until "OUT FRM" appears. (Fig. 9-23.2)
3) Insert the alignment tape (ER2-2), and playback the TC 15 to 20 min portion.

1. BKDV-101

OUT FRM



2. BKDV-200/201

Fig. 1

Fig. 2

Fig. 9-23. Indication of Control Panel Display

4) Adjust the amplitude of the RF envelope center to the maximum by the following procedure.

BKDV-101: Press keys on the control panel in the following sequence.

TEST , F5 (RF)

Set TRACKING display to "VAR" by pressing the F1 key (Fig. 9-23.1) and turn the regulating knob (Fig. 9-24.1) on the control panel.

(Fig. 9-25)

BKDV-200/201: Pull the control knob (Fig. 9-24.2) on the control panel to VARIABLE and turn.

(Fig. 9-25)

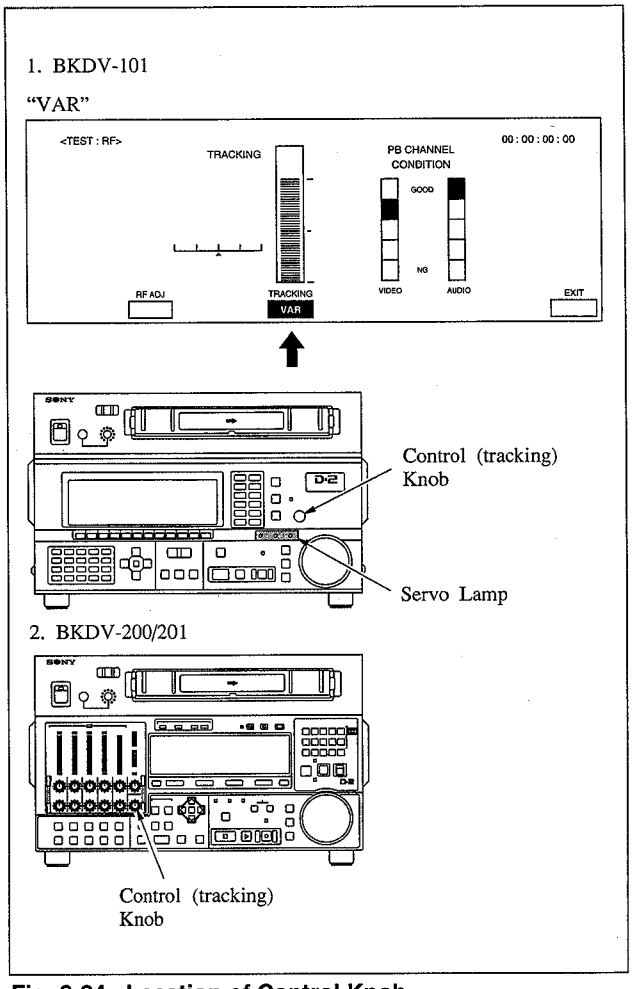


Fig. 9-24. Location of Control Knob

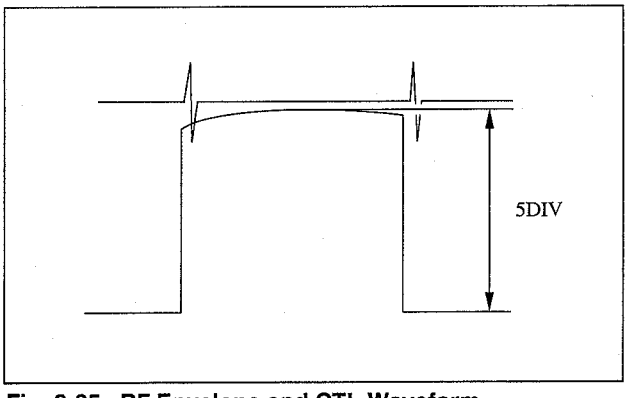


Fig. 9-25. RF Envelope and CTL Waveform

5) Then, set the TRACKING display to "FIX" by the following procedure and check to see if the amplitude of the RF envelope center does not greatly change.
BKDV-101: Press the [F1] key on the control panel.
BKDV-200/201: Press the Tracking Volume.

If the RF waveform greatly changes, loosen the CTL head fixing screws (Fig. 9-26), insert screwdriver into the adjustment hole and move it in the direction shown by an arrow A until the amplitude of the center of RF envelope in "FIX" becomes maximum.
For more details, refer to "step ㉙ CTL Head Position Adjustment".

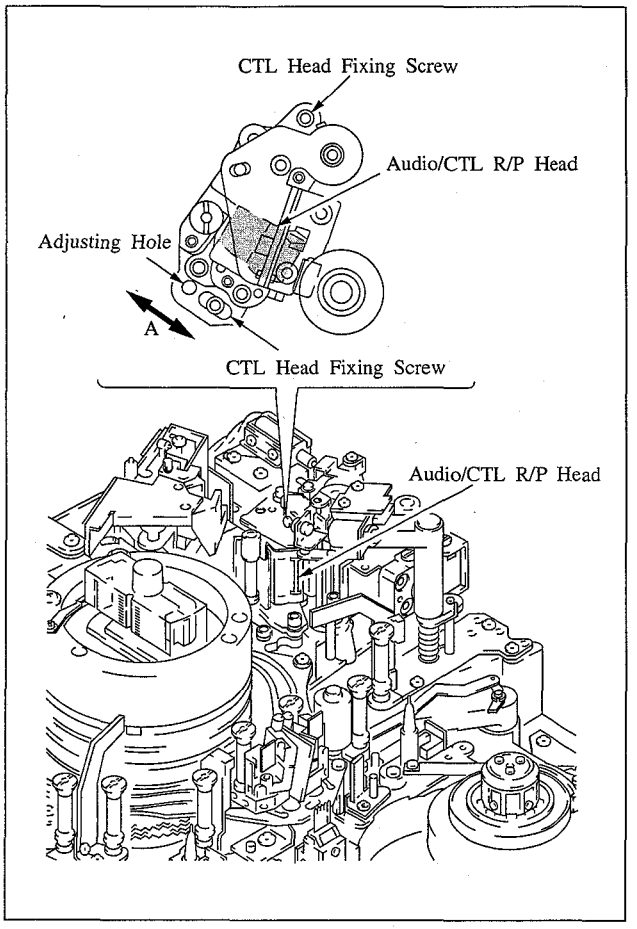


Fig. 9-26. CTL Head Position Rough Adjustment

6) Adjust this maximum RF envelope level to 5 divisions (100%) on the oscilloscope with VAR control of oscilloscope as shown in Fig. 9-25.

Note: When CTL head position is changed by considerable amount, first perform step ㉚ PG Phase Adjustment, then proceed to the next step ⑫ . At this time, specification of the PG phase should be within 0+-10 usec.

⑫ S1 Guide Slantness Check and Adjustment

Preliminary Information

In case immediately after the upper drum assembly is replaced, be sure to put the unit into the REC mode for about 20 minutes using a commercially available tape, before starting this check.

Note: Check to see that the RF envelope is maximum and it is 5 division (100%) on the oscilloscope.

1) Playback ER2-2 (0 to 15min).
2) Raise the S2 guide from the position shown in Fig. 9-27 for the purpose to check the adjustable amount of the adjustment screws A and B in Fig. 9-27. (It is obtained by turning the Height Adjusting Screws counterclockwise shown in Fig. 9-27.)

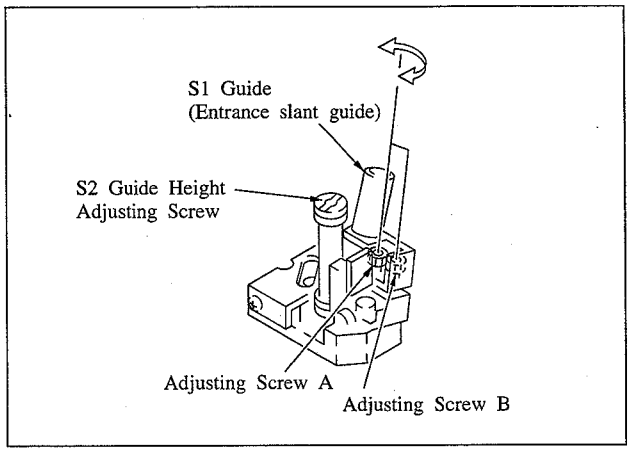


Fig. 9-27. Slant Guide Assembly

As the S2 guide is raised, the upper edge of the tape moves upward following the upper flange of S2 guide so that the RF envelope changes as shown in Fig. 9-27. However when the upper flange is raised higher than a certain point, the tape will no longer follows the upper flange and there will be no change in the RF envelope any more.

The amount of tape to move upward depends upon the slantness of the S1 guide. As the S1 guide is more slanted, lower portion is pressed more strongly against the guide, i. e., the tape tension is higher in the lower portion of the tape. As the tape tension in the lower portion is increased, the amount of tape to move upward becomes greater. (This method of adjustment to increase the tape tension in the lower half of tape with S1 guide is called "higher tension in lower half of tape method", and its amount is called "the amount of higher tension in lower half of tape".)

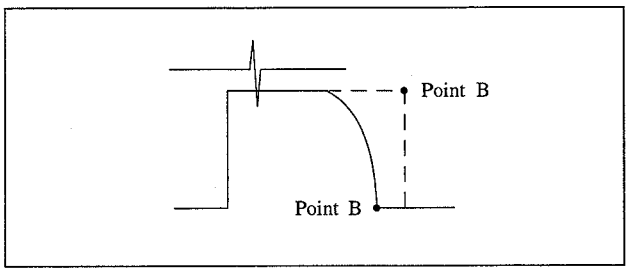


Fig. 9-28. RF Envelope

Note: If the S2 guide is further raised even higher than the point where RF envelope does not change any more, the S2 guide's bottom flange contacts the bottom edge of tape and starts pushing the tape upward that changes the RF envelope again. This change is not the desired result from the slant adjustment. This phenomenon should be avoided. Do not raise the S2 guide too high. If this phenomenon is difficult to recognize, observe a clearance between bottom edge of tape and lower flange of S2.

Change prosess of RF envelope is described as follows.

As an example, the S2 guide's height is first raised, and will reach the point where RF envelope will not change any more. Assuming that the point is shown in ⓓ in Fig. 9-29.

Observe the change of point-Ⓑ in ⓐ, ⓑ, ⓒ, ⓓ of Fig. 9-29. As the S2 guide's height is raised, the point- Ⓑ starts decreasing from the initial state of ⓐ to ⓑ, ⓒ and reaches 0% level in ⓓ finally.

The slant adjustment of the S1 guide affects in such a manner that the S1's slantness determines the point-B to be either ⓑ or ⓓ characteristics.

Required specification for the point-B position is shown below (Fig. 9-30). If the specification is not satisfied, adjust it using the adjustment procedure described in the following paragraph.

Specification:Point B must be within ▨ in the Fig. 9-30.

An example within the specification is shown in Fig. 9-31. Because point B fluctuates slightly, check that its center meets the specification.

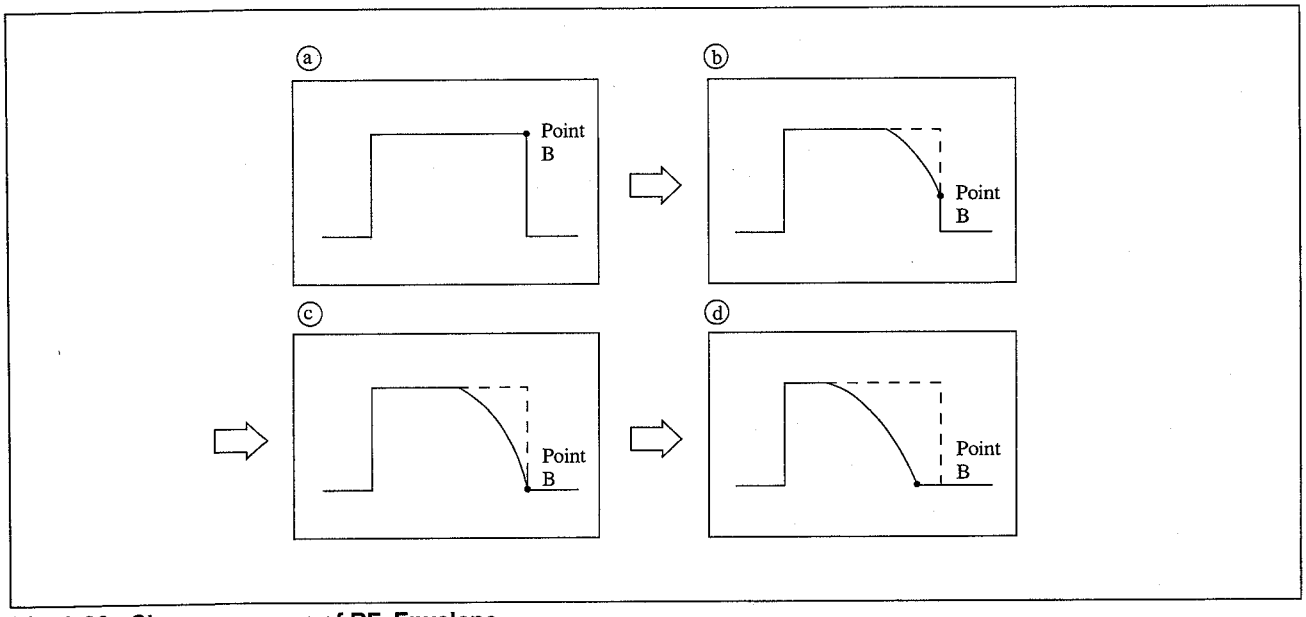


Fig. 9-29. Change process of RF Envelope

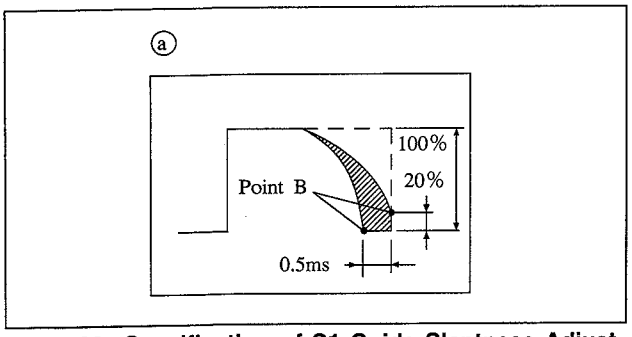


Fig. 9-30. Specification of S1 Guide Slantness Adjustment

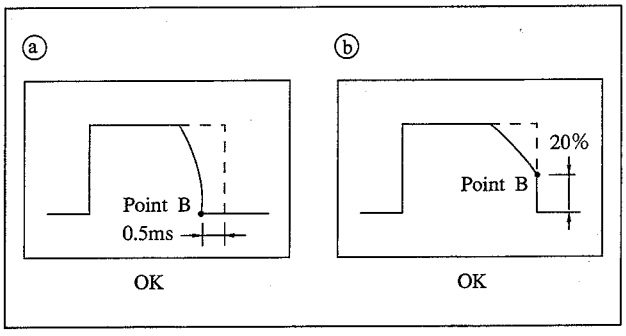


Fig. 9-31. OK

3) If point B does not satisfy the specification, adjust it as below:

(i) In case of ⓐ in Fig. 9-32.

This shows that the tape has too high tension at the lower part. Adjust to reduce the tension. Slightly loosen adjusting screw B in Fig. 9-27, and slightly tighten adjusting screw A. Then, tighten adjusting screw B, and adjusting screw A with a tightening torque of 29.4 N·cm (3 kgf·cm) .

Lower the S2 guide again, returning it to the normal position. And then raise it to a point where the envelope no longer changes, and check that point B satisfies the specification.

In case of ⓐ, too high tension at the lower part of tape can also be recognized by tape curl at the upper flange of the S2 guide that tend to occur in the tape as shown in Fig. 9-33.

(ii) In case of ⓑ in Fig. 9-32

This shows that the tape tension at lower part is too low. Adjust to increase the tension.

Slightly loosen adjusting screw A in Fig. 9-27, and slightly tighten adjusting screw B. Then, tighten adjusting screw A, and adjusting screw B with a tightening torque of 29.4 N·cm (3 kgf·cm).

Lower the S2 guide again, returning, it to the normal position. And then raise it to a point where the RF envelope no longer changes. Check that point B satisfies the specification.

4) Unthread ER2-2 once and play it back again to make sure that the specification of 2) is satisfied. If the result is NG, repeat from 1).

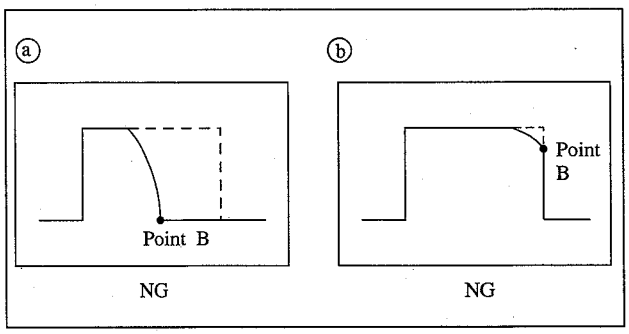


Fig. 9-32. NG

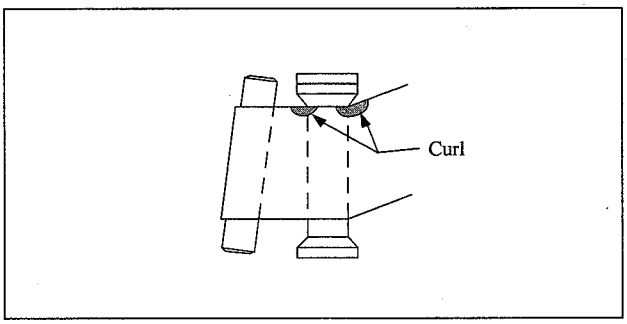


Fig. 9-33. Tape Path of S2 Guide

⑬ S2 Guide Height Check and Adjustment

After completion of S1 guide adjustment, adjust the height of the S2 guide.

1) Set the TRACKING to "VAR".
   When the adjusting control (See Fig. 9-24) on the control panel is turned right and left, the "a" portion of Fig. 9-35 should change in parallel.
   If not, adjust S2 guide's height to change in parallel as possible. (See Fig. 9-34)
   But, "b" portion of Fig. 9-35 is determined depending upon the shape of rabbet guide of the drum. So, adjust S2 height to make "a" as parallel as possible.

   When portion "a" in Fig. 9-35 does not move parallel.

   - In case of (a) (See Fig. 9-36.)
     Lower the height of S2 guide because it is too high.
   - In case of (b) (See Fig. 9-36.)
     Raise the height of S2 guide because it is too low.

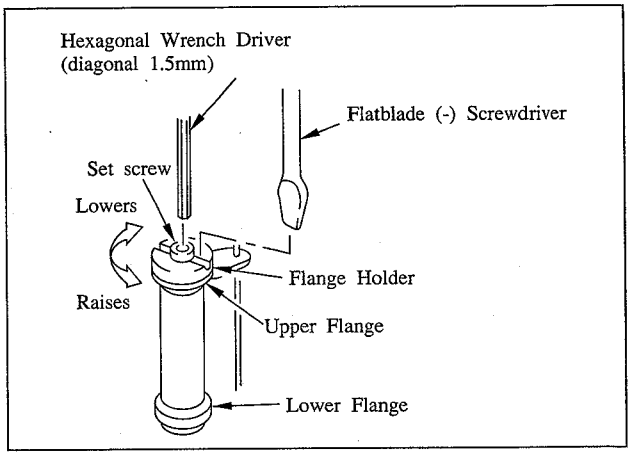


Fig. 9-34. S2 Guide Height Adjustment

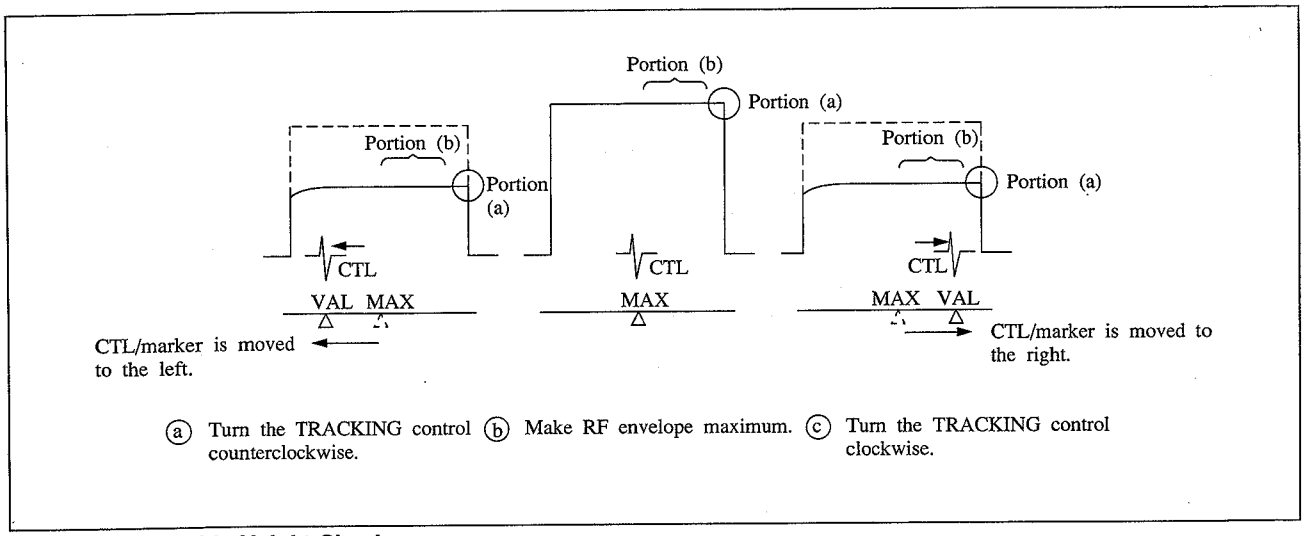


Fig. 9-35. S2 Guide Height Check

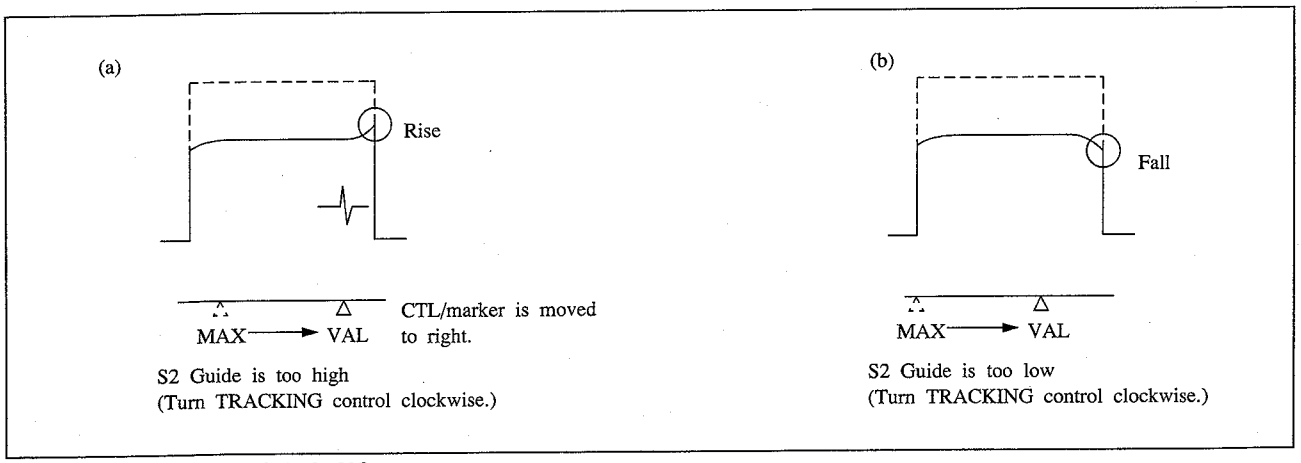


Fig. 9-36. S2 Guide Height is NG.

2) After making this adjustment, tighten the set-screw shown in Fig. 9-34.

3) After tightening the set-screw, repeat 1) to make sure that the part "a" in Fig. 9-35 moves in parallel. If the result is NG, repeat the adjustment from 1).

4) Unthread ER2-2 once and play it back again to make sure that the part "a" in Fig. 9-35 moves in parallel. If the result is NG, repeat the adjustment from 1).

⑭ S2 GUIDE CURL CHECK

Check that there is no curl on the front and rear sides of the S2 guide as shown in Fig. 9-34.

⑮ Set the unit from PLAY (+1) mode into VAR (-1) mode

⑯ S2, S3, S4, S5 and S6 Guides Tape Run Check (-1)

S2, S3, S4, S5 and S6 Guides

•••As shown in Fig. 9-19 (a), A very small curl appearing at the side of the flange without causing the tape damage is OK. However, perform adjustment to minimize the curl or wrinkle.

As shown in Fig. 9-19 (b), it is NG when the tape is folded on the flange, in other words, tape runs over the flange.

Note: Since S6 guide uses a barrel-shaped type roller, a wrinkle around the middle of tape due to a barrel-shaped type can be ignored. However, it is NG that a wrinkle caused by pressing the tape edge downward with the flange.

If the result is NG, repeat the adjustment from the step ⑤.

9-3-3. PROCEDURE 2 T-Side Tracking Adjustment

⑰ Preparation for Adjustment

1) Connect TP101 (REC, CH-A OUT) of the REC-11 Circuit Board and TP19 (CTL OUT) of the AE Circuit Board to CH-1 and CH-2 of an oscilloscope, respectively. Connect CF PULSE OUT (BNC connector) of the connector panel to the oscilloscope as trigger input. The REC, CH-A OUT can also be taken out from WFM OUT by the following procedure.
   BKDV-101: Press the VIDEO OUT key on the control panel to set WFM to "AUX".

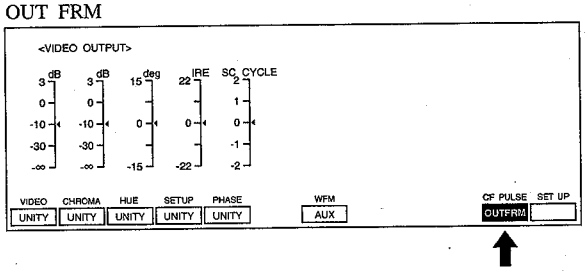
   BKDV-200/201: Press SET key on the control panel.

2) Set the CF PULSE display to "OUT FRM" by the following procedure.
   BKDV-101: Press the VIDEO OUT key on the control panel.
   Set CF PULSE display to "OUT FRM" by pressing the F11 key. (Fig. 9-37.1)
   BKDV-200/201: Press the SET UP key on the control panel.
   Select 209 [CF PULSE SELECT] by turning the JOG DIAL. After pressing the > key, keep pressing the ^ key until "OUT FRM" appears. (Fig. 9-37.2)

3) Install the alignment tape (ER2-2) and playback the TC (0 to 15min) portion.

1. BKDV-101

OUT FRM



2. BKDV-200/201

Fig. 1

Fig. 2

Fig. 9-37. EL Panel Display

4) Adjust center of the RF envelope amplitude to the maximum by the following procedure.
BKDV-101: Press keys on the control panel in the following sequence.
[TEST], [F5] (RF)
Press the [F1] key to set TRACKING display to "VAR"(Fig. 9-37.1). Turn the control knob on the control panel for maximum amplitude. (Fig. 9-38.1)
BKDV-200/201: Pull the control knob (Fig. 9-37-2) on the control panel to VARIABLE and turn it for adjustment.

5) Set the maximum RF envelope level to 5 divisions (100%) on the oscilloscope as shown in Fig. 9-39.

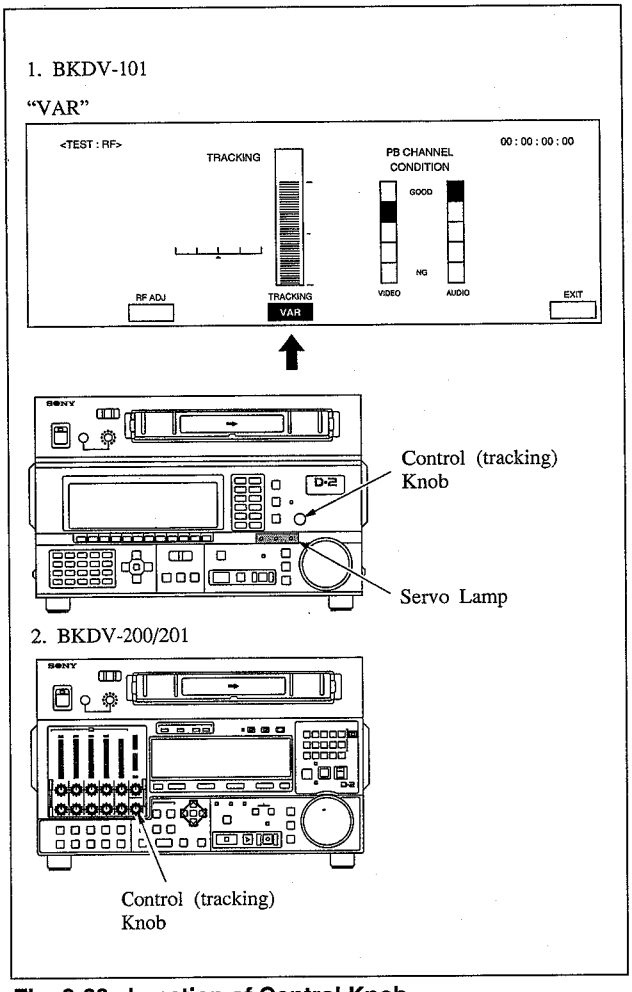


Fig. 9-38. Location of Control Knob

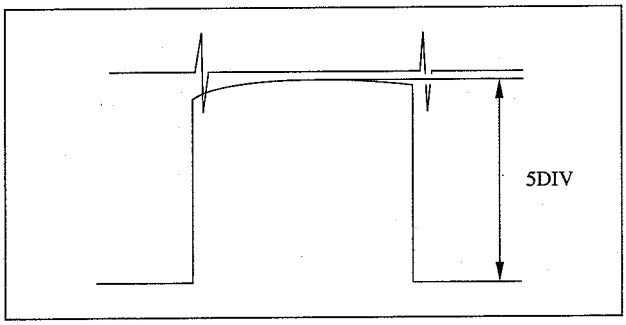


Fig. 9-39. RF Envelope and CTL Waveform

⑱ T1 Guide Slantness Check and Adjustment

1) (T2 guide height tentative adjustment)
Set TRACKING to "VAR". Check to see if the part "a" in Fig. 9-41 moves in parallel when the control knob (Fig. 9-41) on the control panel is turned to left and right. If it does not move in parallel, turn the set screw shown in Fig. 9-40 according to the following instruction until the part "a" moves in parallel.

2) (T3 guide height tentative adjustment)
Loosen the set screw of the T3 guide shown in Fig. 9-42 and make tape curl at the lower flange by pressing the flange retainer. Turn the flange retainer in the clockwise direction to lower the T3 guide. When the curl disappears, tighten the set screw.

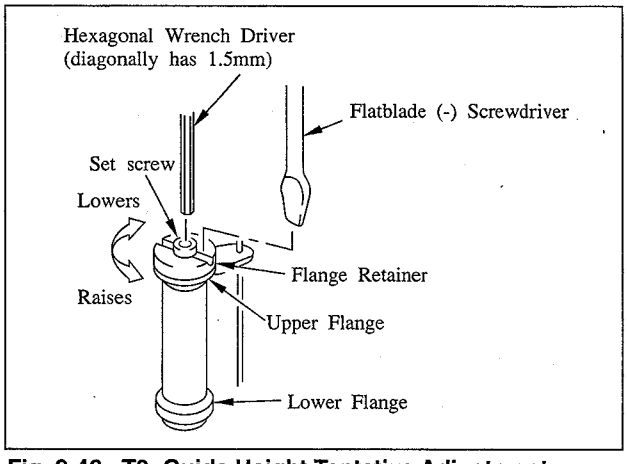


Fig. 9-40. T2 Guide Height Tentative Adjustment

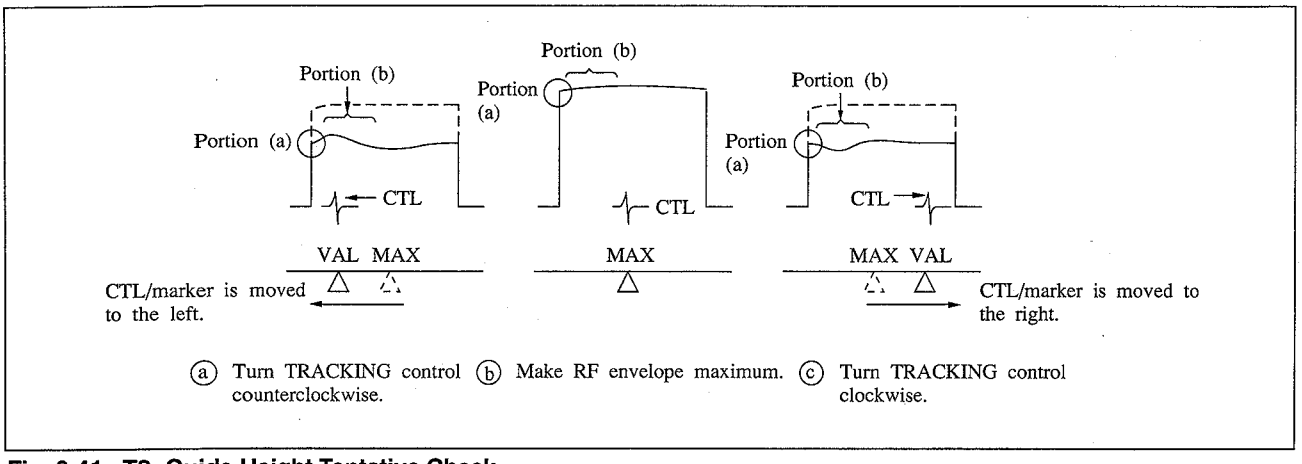


Fig. 9-41. T2 Guide Height Tentative Check

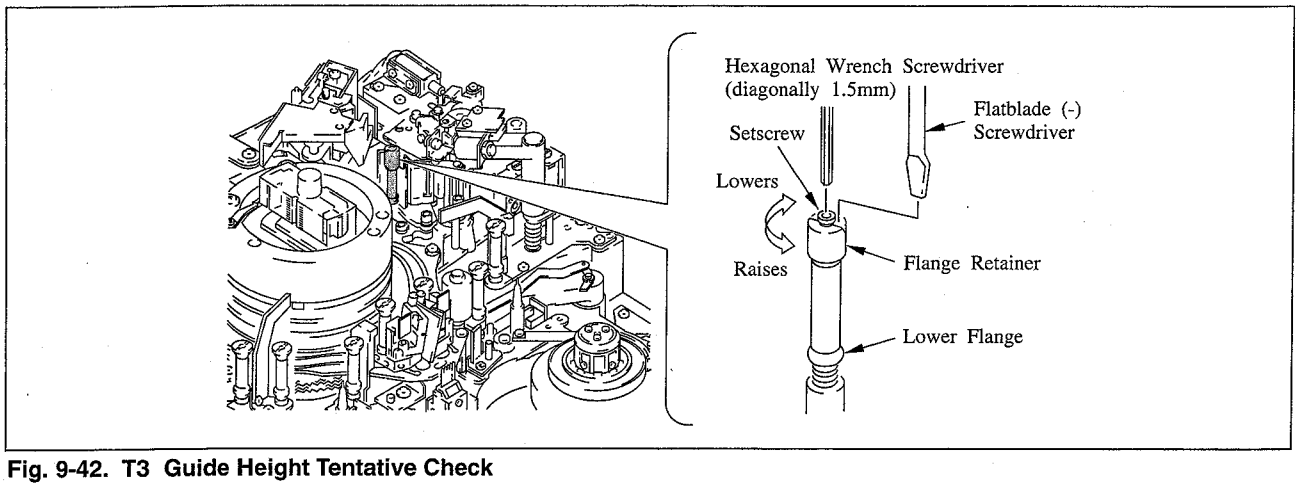


Fig. 9-42. T3 Guide Height Tentative Check

3) Raise the T2 guide from the position shown in Fig. 9-39 in order to check the adjustable amount of the adjusting screws A and B. (It is obtained by turning the Height Adjusting Screws counterclockwise shown in Fig. 9-43.)

The tape follows the upper flange so that the RF envelope changes as shown in Fig. 9-44. However when the upper flange is raised to a certain point, the tape no longer follows the upper flange and there will be no change in the RF envelope.

The amount of tape to move upward depends upon the slantness of the S1 guide. As the S1 guide is more slanted, lower portion is pressed more strongly against the guide, i. e., the tape tension is higher in the lower portion of the tape. As the tape tension in the lower portion is increased, the amount of tape to move upward becomes greater. (This method of adjustment to increase the tape tension in the lower half of tape with S1 guide is called "higher tension in lower half of tape method", and its amount is called "the amount of higher tension in lower half of tape".)

Note: If the S2 guide is further raised even higher than the point where RF envelope does not change any more, the S2 guide's bottom flange contacts the bottom edge of tape and starts pushing the tape upward that changes the RF envelope again. This change is not the desired result from the slant adjustment. This phenomenon should be avoided. Do not raise the S2 guide too high. If this phenomenon is difficult to recognize, observe a clearance between bottom edge of tape and lower flange of S2.

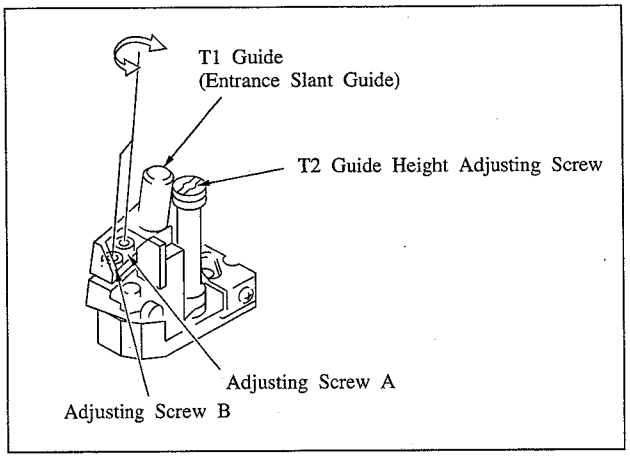


Fig. 9-43. Slant Guide Assembly

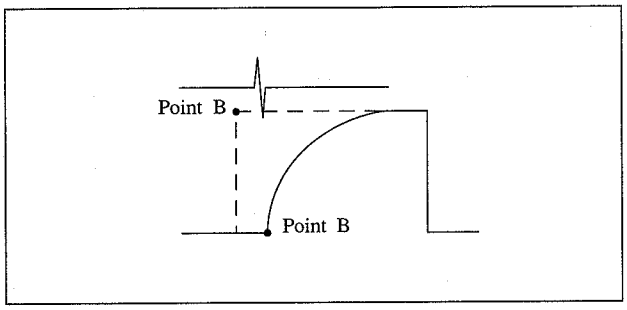


Fig. 9-44. RF Envelope

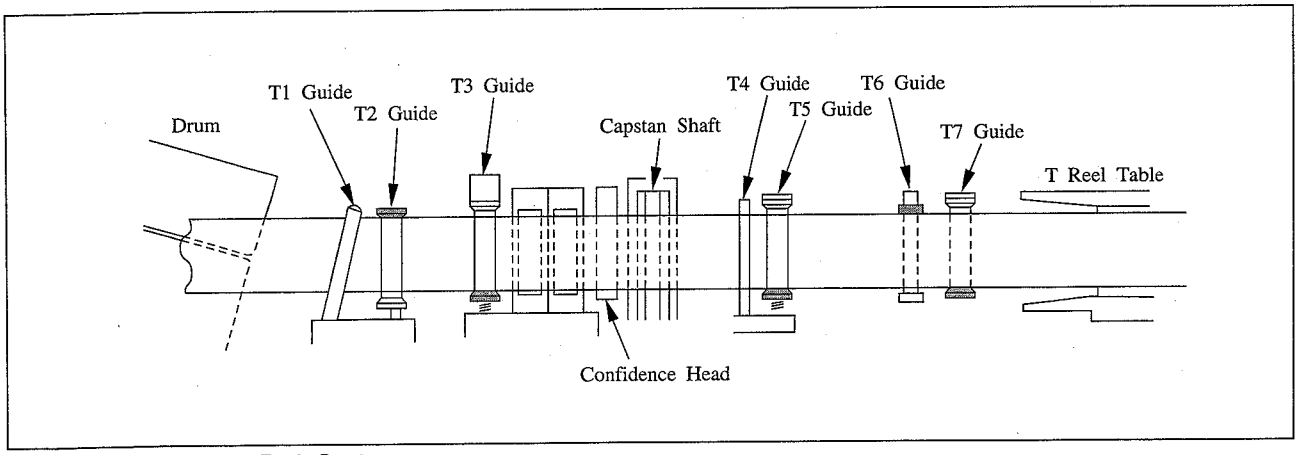


Fig. 9-45. T-side Tape Path System

The specification of the point B is as follows.

Note : This specification must be checked under the following condition. The T3 guide generates neither a wrinkle, nor a curl when the T2 guide is set to the height that produces the maximum RE envelope at T side.

Specification : The point B must be in the shaded ▨ part of Fig. 9-46. Because the point B has some fluctuation, make sure that its center meets the specification. Fig. 9-47 shows an example in which the specification is satisfied.

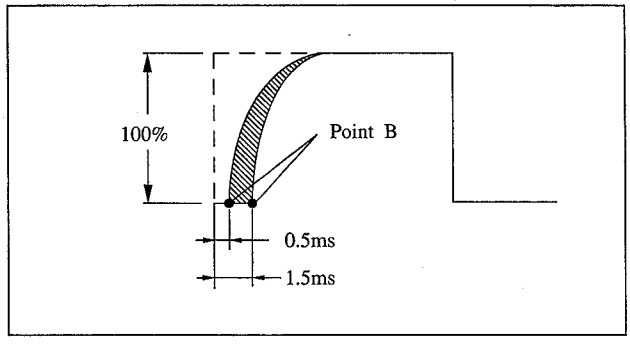


Fig. 9-46. Specification of T1 Guide Slantness Adjustment

4) If point B does not to satisfy the specification, adjust it as below:

(i) In case of ⓐ in Fig. 9-48.

This shows that the tape has too high tension at the lower part. Adjust to reduce the tension. Slightly loosen adjusting screw B in Fig. 9-43, and slightly tighten adjusting screw A. Then, tighten adjusting screw B, and adjusting screw A with a tightening torque of 29.4 N·cm (3kgf·cm).

Lower the T2 guide again, returning it to the normal position. And then raise it to a point where the envelope no longer changes, and check that point B satisfies the specification.

In case of ⓐ, too high tension at the lower part of tape can also be recognized by tape curl at the upper flange of the T2 guide that tend to occur in the tape as shown in Fig. 9-49.

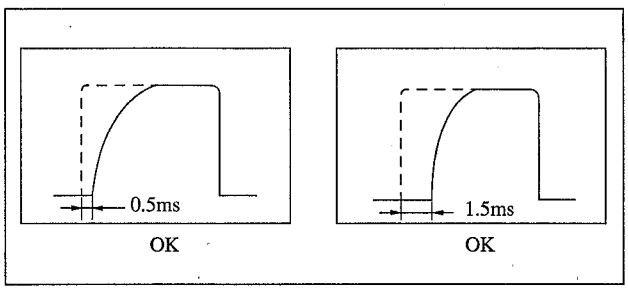


Fig. 9-47. OK

(ii) In case of ⓑ in Fig. 9-48

This shows that the tape tension at lower part is too low tension. Adjust to increase the tension.

Slightly loosen adjusting screw A in Fig. 9-43, and slightly tighten adjusting screw B. Then, tighten adjusting screw A, and adjusting screw B with a tightening torque of 29.4 N·cm (3kgf·cm).

Lower the T2 guide again, returning it to the normal position then raise it to a point where the RF envelope no longer changes. Check that point B satisfies the specification.

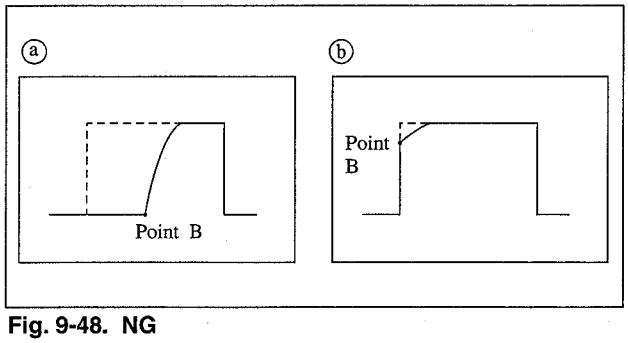


Fig. 9-48. NG

5) Unthread ER2-2 once and play it back again to make sure that the specification of 3) is met. If the result is NG, repeat the adjustment from the step 3).

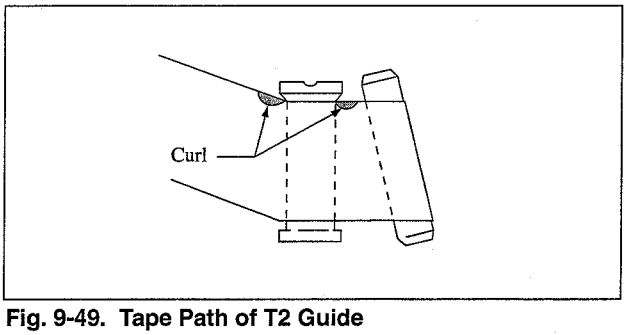


Fig. 9-49. Tape Path of T2 Guide

When checking the point B position by raising the T2 guide, tape moves up also at the CTL/TC/CUE stationary head. Then the CTL playback can go OFF TRACK and its output becomes low. If the CTL output level drops to about 0.6Vp-p, servo system is unlocked, SERVO LED on the control panel blinks and the RF envelope fluctuates.
In this situation, loosen the setscrew in Fig. 9-50, turn the head height adjusting screw counterclockwise in order to raise the stationary head assembly and increase the CTL playback output. (Normally about 1 to 1.3V.)

Note: If the damage of the top edge of TAPE (ER2-2) is havily damaged enough to be seen, it will not show the correct value of tape tension (i. e., "higher tension at lower part of tape" in this adjustment.) accurately. In such a case, use an undamaged part.

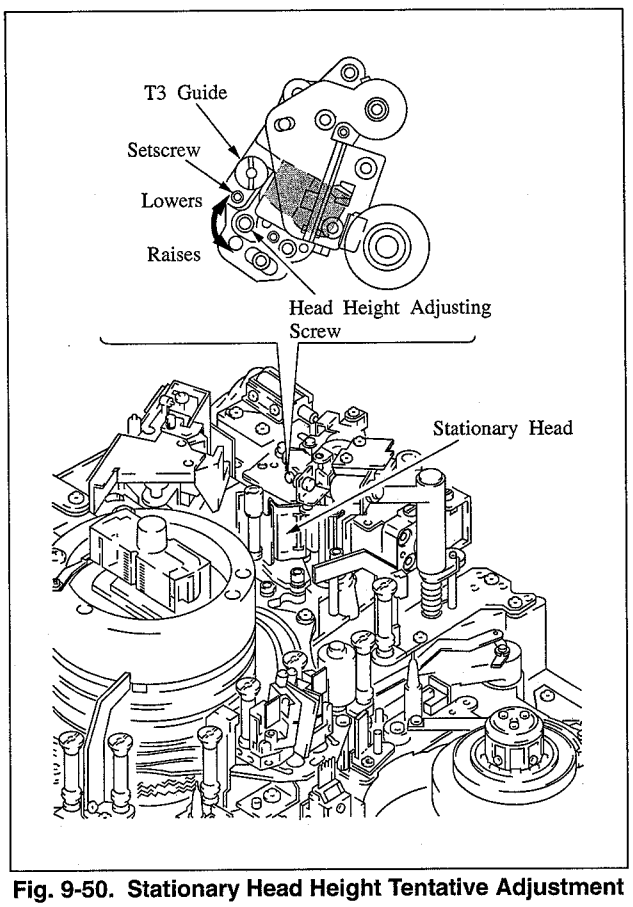


Fig. 9-50. Stationary Head Height Tentative Adjustment

⑲ T2 Guide Height Cheek and Adjustment

After completion of the T1 guide height adjustment, adjust the T2 guide height.

1) Set TRACKING to "VAR". Adjust the height of the T2 guide so that the part "a" in Fig. 9-52 moves in parallel when the control knob (Fig. 9-38) on the control panel is turned to left and right. (Refer to Fig. 9-51)
Note that the part "b" in the illustration is influenced by the shape of the rabbet guide of the drum.
Therefore, adjust so that the part "a" move in parallel.
If the part "a" in Fig. 9-52 it does not move in parallel, make the following adjustment.
When the result is Fig. 9-53 (a), the T2 guide is too high. Therefore, lower its height.
When the result is Fig. 9-53 (b), the T2 guide is too low. Therefore, raise its height.

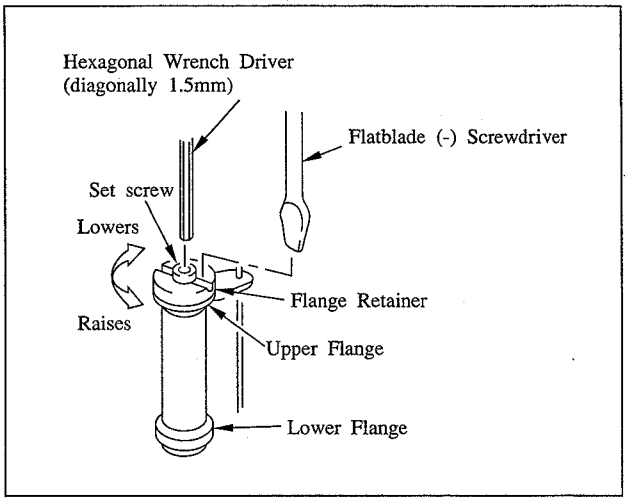


Fig. 9-51. T2 Guide Height Adjustment

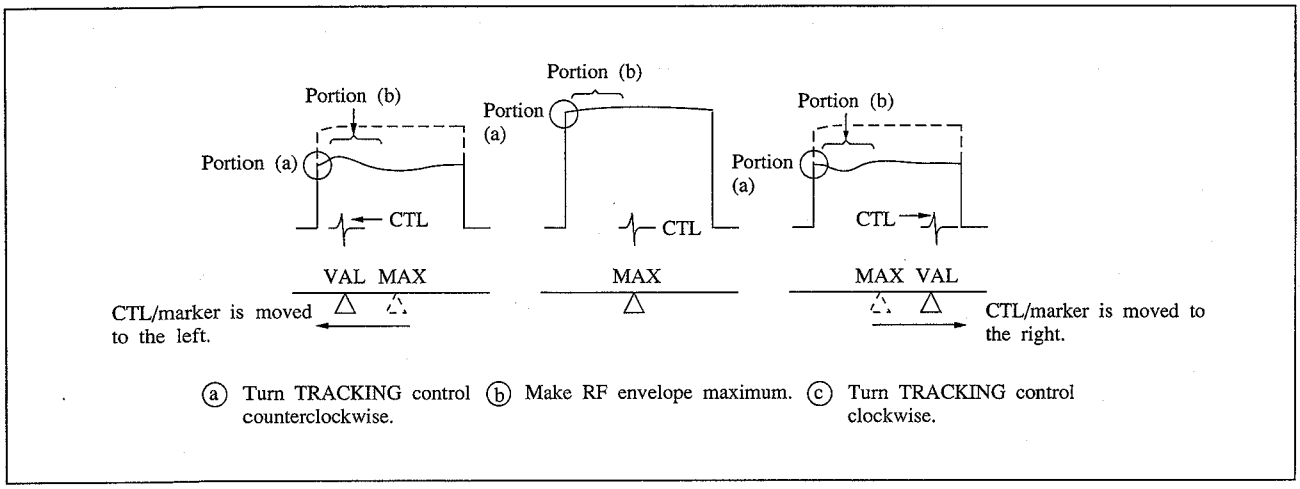


Fig. 9-52. T2 Guide Height Check

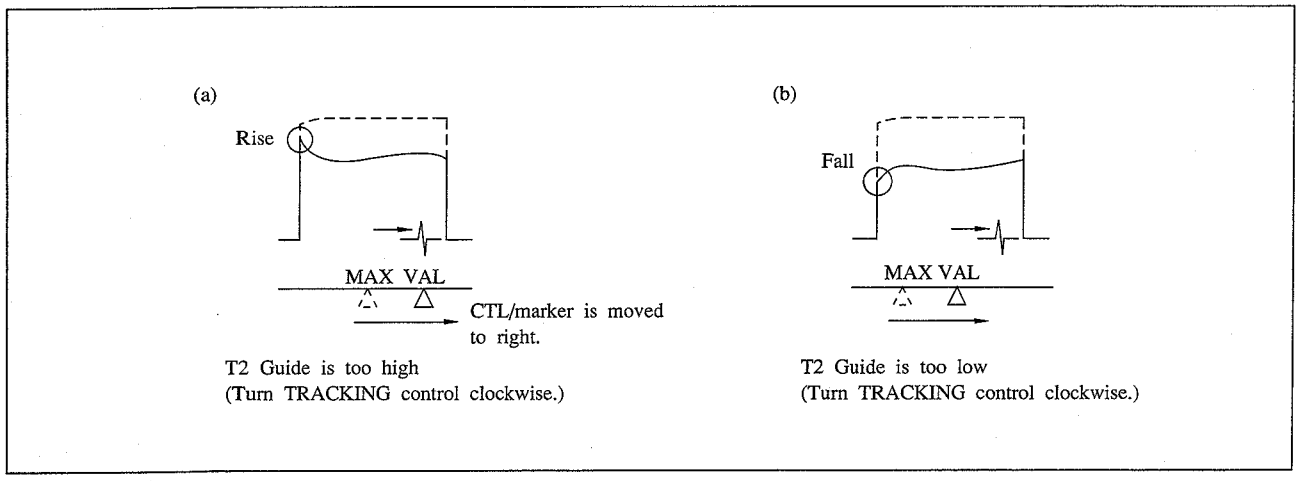


Fig. 9-53. NG

2) After making the above adjustment, tighten the set screw shown in Fig. 9-51.

3) After tightening the set screw, repeat 1) to make sure that the part "a" in Fig. 9-52 moves in parallel. If the result is NG, repeat the adjustment from 1).

4) Thread ER2-2 once and reproduce it again. Repeat 1) once more to make sure that the part "a" in Fig. 52 moves in parallel. If the result is NG, repeat the adjustment from the step 1).

⑳ T3 Guide Height Adjustment (+1)

Be sure to perform this adjustment when ever T2 guide was touched (adjusted).

1) Loosen the setscrew. Turn the flange retainer to make tape curl at the lower flange.

2) Turn the flange retainer clockwise in order to lower the T3 guide. Then tighten the setscrew with a tightening torque of 58.8 N·cm (6 kgf·cm) at the point where tape curl disappears.

3) After tightening the set screw, check the followings.
   - The RF envelop which was adjusted in the step (19) has not changed.
   - The lower flange of the T3 guide is producing neither a wrinkle, nor a curl.

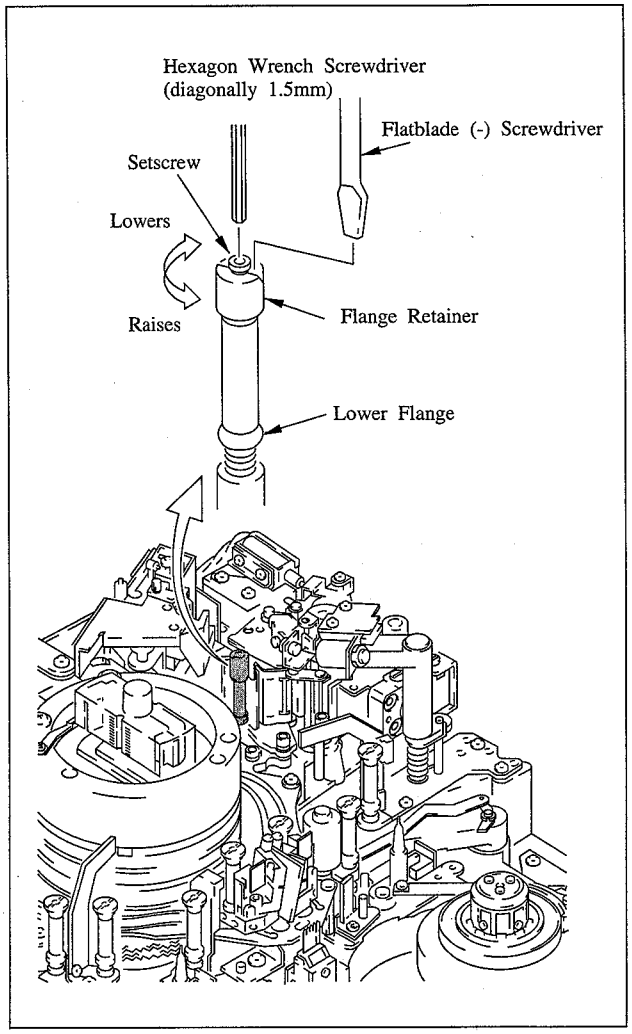


Fig. 9-54. T3 Guide Height Adjustment

㉑ Wrinkle Between T1 and T2 Guides (+1) Check

Check to see that the tape is not curled around upper flange of T2 guide as shown in Fig. 9-55.

㉒ Then, change the setting from PLAY (+1) to VAR (–)

㉓ T2 and T3 Guides Tape Run Check (–1)

T2 guide

•••• It should produce neither a wrinkle nor a curl.

T3 guide

••••A very small curl which is produced on the sides of the flange, not damaging a tape is acceptable. (However, make an adjustment to make the curl smallest.) If the tape is folded upon the flange (the tape runs over the flange) is NG.

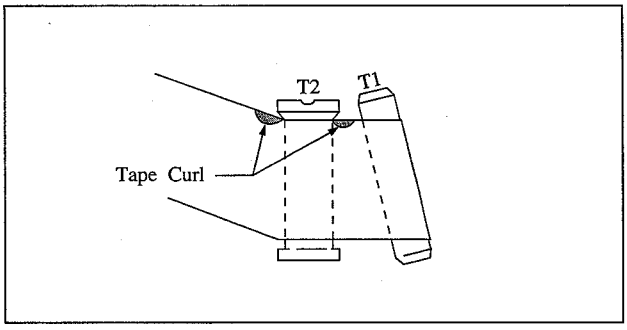


Fig. 9-55. Curl Check Around Upper Flange of T2 Guide

㉔ Tracking check (+1)

1) Install the ER2-2 and play it back at the TC 15 to 20 min portion.

2) Turn the control knob on the control panel until the RF envelop becomes the largest.

3) Make sure that the specification shown in Fig. 9-56 is satisfied. If it is not satisfied, repeat the step ⑫.

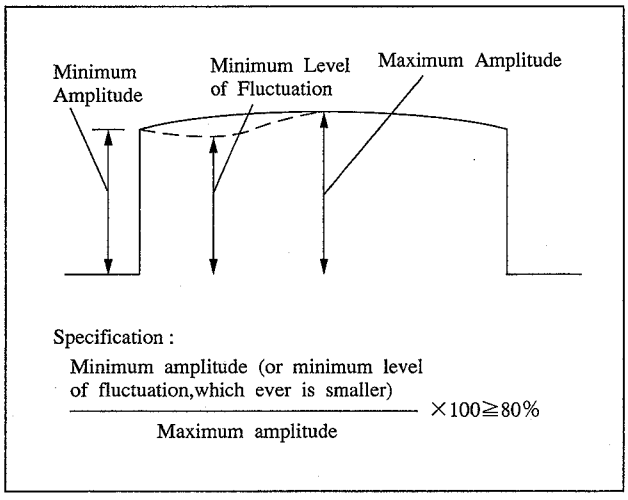


Fig. 9-56. Tracking Check

㉕ Tentative adjustment of T5, T6 and T7 guides (+1)

1) Reproduce an ordinary-use tape.
2) Adjust the flange height as shown in Fig. 9-57 until the flanges of these guides produce no curl.

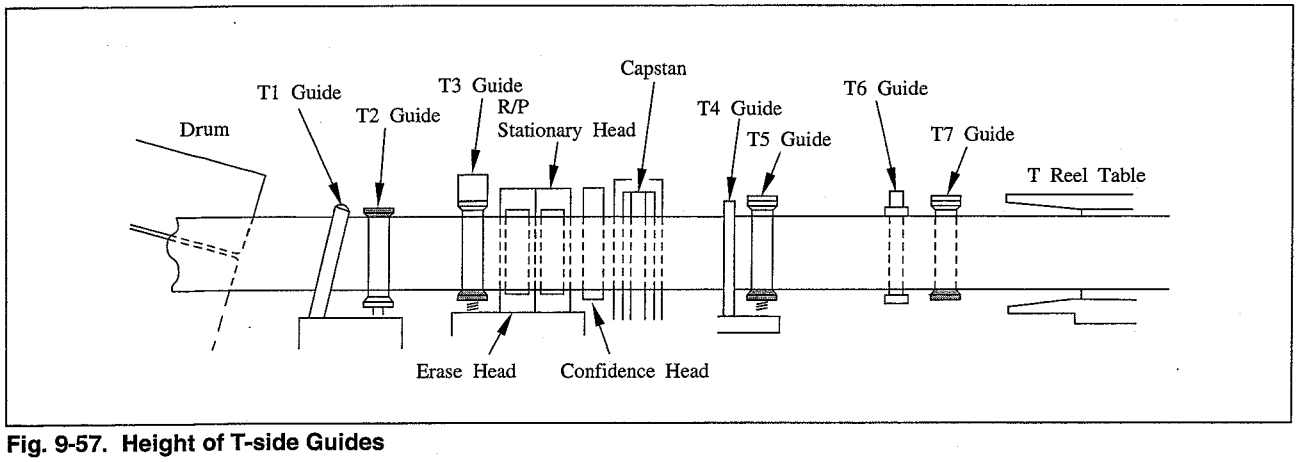


Fig. 9-57. Height of T-side Guides

㉖ Stationary Head R/P Azimuth Adjustment

Preliminary Information

Azimuth is adjusted by playing back the CUE track signal (10 kHz) of the alignment tape (ER2-2). Be sure to perform the ㉗ stationary head height adjustment after this adjustment is tried.

Note: The screws C and D in Fig. 9-55 are screws for the zenith adjustment. Never turn them.

Stationary head R/P azimuth adjustment

1) Connect TP-20 of the AE-15 board to the oscilloscope. (Fig. 9-58.)

2) Play back the alignment tape (ER2-2, TC 0 to 30 min).

3) Check that tape does not curl on the T3 guide flange. If there is curl, adjust the height of the T3 guide.

4) As a preparation for the azimuth adjustment, check the head height. Here, check whether the CUE track output is the maximum, by the following procedure.
Check that the CUE track output always decreases when the tape edge portion (back coat side) between T2/T3 guides is pushed up and down with your finger, as shown in Fig. 9-59.
If the output increases when this portion is touched, loosen the head height lock screw (set-screw) and adjust the head height adjusting screw so that the output becomes maximum. (See ㉗ stationary R/P Head Height Adj.)
After adjustment, tighten the head height lock screw (set-screw), and again check that the output is maximum.

5) Check to see if the CUE track output always becomes small when tape near the screws A and B (azimuth adjusting screws) shown in Fig. 9-59 are pressed. If the result is OK, go to the step (27).
If the result is NG, go to 6).

6) After 5), tighten the screw which increases the CUE track output until the output reaches the maximum. The tightening torque is 58.8 N·cm (6 kgf·cm). If it cannot be tightened, loosen the opposite screw and tighten this screw again.

7) Repeat 6) until the specification of 5) is satisfied.

8) Check the step 4).
If it is NG, repeat step 4) and onwards.

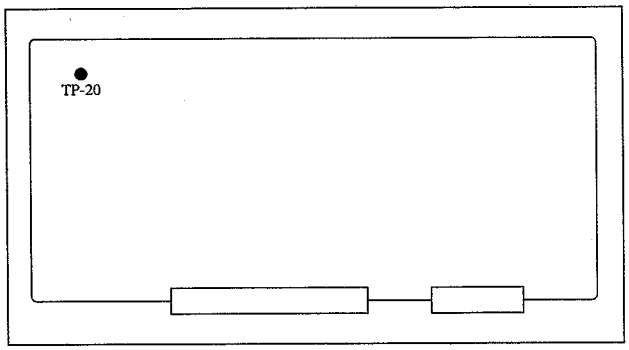


Fig. 9-58. AE-15 Board

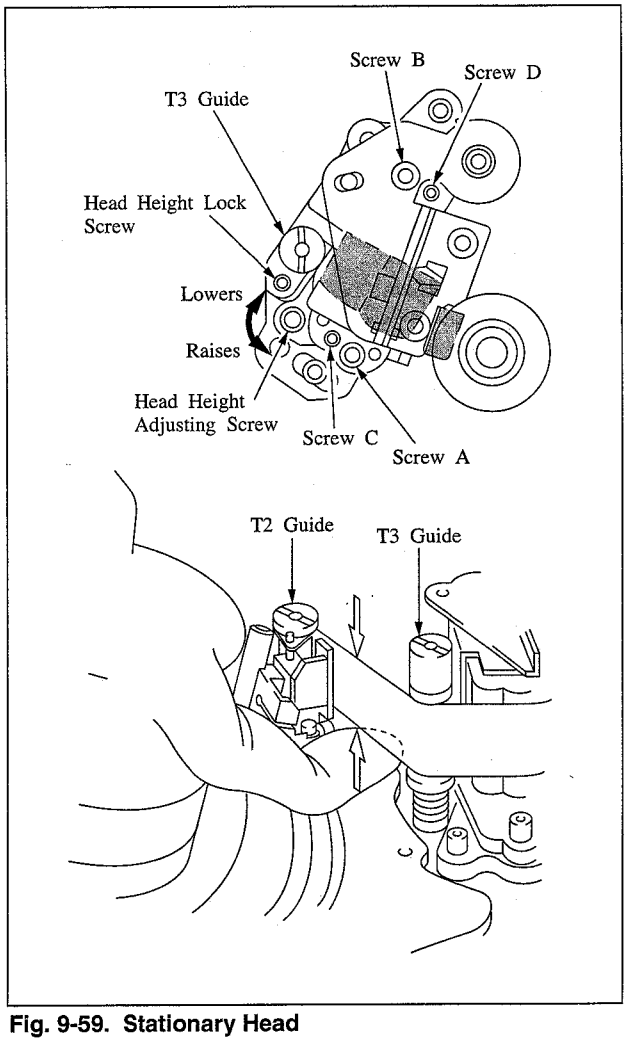


Fig. 9-59. Stationary Head

㉗ Stationary R/P Head Height Adjustment

Preliminary Information

A. CTL head height check and adjustment can be performed by playing back the CTL signal portion of an alignment tape (ER2-2).

Stationary Head Height Check

1) Connect oscilloscope to TP19 on AE-15 board.
   Set oscilloscope to 100 mV/DIV.

2) Play back the alignment tape. (ER 2-2, TC 0 to 30 min)

3) Confirm that the tape runs in contact with the lower flange of the T3 guide without curl.
   If there is a curl, loosen the setscrew on the top of the T3 guide and perform adjustment by turning the flange holder.
   After the completion of adjustment, tighten the setscrew.

4) Confirm the amplitude of CTL signal by pushing up or pressing down the tape edge (back-coated side) between T2 and T3 guides with finger.
   When the amplitude always becomes small by pushing up or pressing down the tape edge, this adjustment is not necessary.
   If not, perform the following adjustment.
   (However, when changing the stationary head height with step ⑱ T1 Guide Slantness Check/Adjustment, be sure to perform the next adjustment. Also, when changing the T3 guide height, perform the next adjustment.)

Stationary Head Height Adjustment

Note: The screws C and D in Fig. 9-55 are screws for the zenith adjustment. Never turn them.

5) Loosen the setscrew shown in Fig. 9-60.
   • Hexagon Wrench Screwdriver:
   (diagonally 1.5mm)

6) Turn the head height adjusting screw so that the amplitude of CTL signal becomes maximum.
   • Hexagon Wrench Screwdriver:
   (diagonally 2.5mm)

7) Tighten the setscrew loosened in step 5) and confirm that the amplitude of CTL signal is maximum.

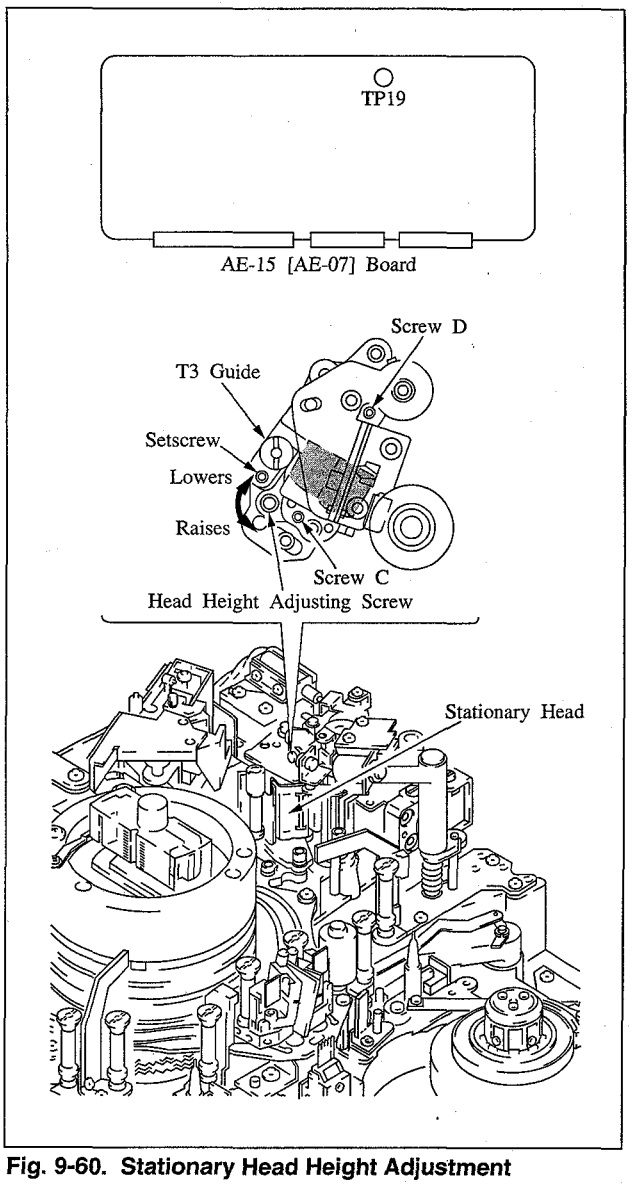


Fig. 9-60. Stationary Head Height Adjustment

[Know-how]
(Because the head height tends to raise when the setscrew is tightened, the following adjustment is proposed.)

1) Turn the head height adjusting screw so that the lower edge (Fig. 9-61 point D) of the CTL pulse goes down as lower as possible, in the other words, maximize the amplitude. Next, turn the adjusting screw in the clockwise direction and stop where the lower edge of the CTL pulse becomes 10 to 15 mV higher than the lowest position.

2) After tightening the setscrew, check that the envelope amplitude becomes maximum. If not, go to readjustment.

㉘ Stationary Confidence Head Height Adjustment

Preliminary Information

This adjustment is to match the height of the CTL, T/C tracks of the stationary confidence head to those of the CTL, T/C tracks of the stationary R/P head.

Height Adjustment

1) Connect TP-1 (CTL) and TP-5 (T/C) of the ED-24 Board to CH-1 and 2 of the oscilloscope (Fig. 9-62).

2) Set to the recording condition using a commercially available cassette tape.

3) Loosen the Confidence height lock screw. (Fig. 9-63)

4) Rotate the confidence height adjusting screw so that the CTL output is maximum and adjust the VAR control of oscilloscope so that signal is 5 DIV on the oscilloscope.

5) Rotate the confidence height adjusting screw so that the T/C output is maximum and adjust the VAR control of oscilloscope so that signal is 5 DIV on the oscilloscope.

6) Rotate the confidence height adjusting screw so that the CTL output and the T/C output becomes the same level. (Fig. 9-63)

7) Tighten the confidence height lock screw.

8) After tightening, check that the level that was adjusted in step 6) has not changed. If has changed, repeat step 6).

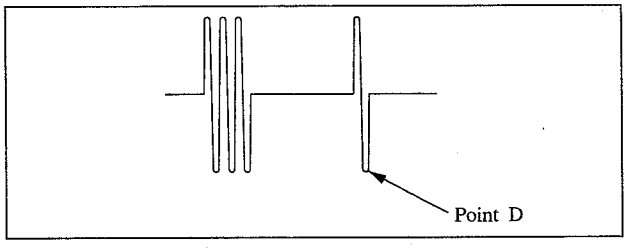


Fig. 9-61. CTL Pulse

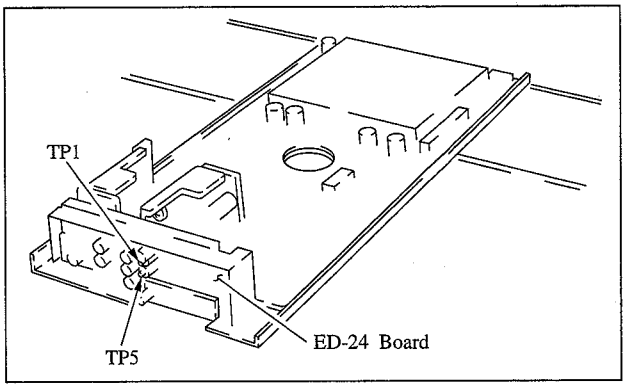


Fig. 9-62. ED-24 Board

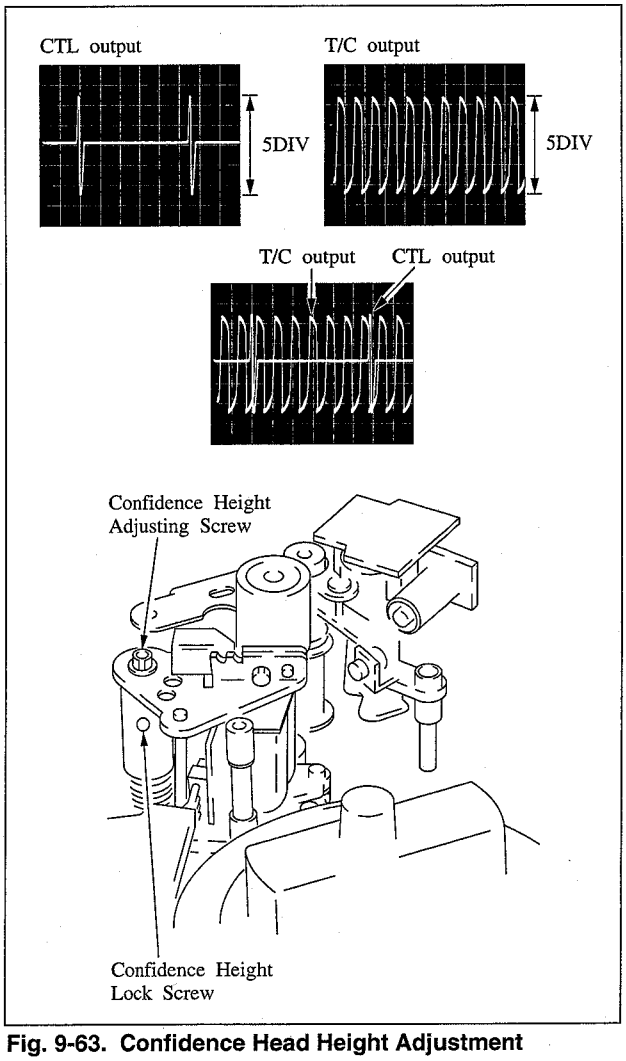


Fig. 9-63. Confidence Head Height Adjustment

㉙ CTL Head Position Adjustment

Preliminary Information

A. Purpose of this adjustment is to maintain tape interchangeability by adjusting the longitudinal distance between the CTL head and rotary head against the recorded pattern of an alignment tape (ER2-2).

B. If the CTL head is moved, the PG phase changes. Thus be sure to perform "㉚ PG Phase Adjustment" after performing the CTL head position adjustment.

Adjusting method:

1) Connect CH-1 of oscilloscope to TP101 (REC CH-A OUT) on REC-03 board and CH-2 to TP19 (CTL OUT) on AE board. Trigger oscilloscope from CF PULSE OUT (BNC connector) on the connector panel.

   Note that REC, CH-A OUT can be taken out also from WFM OUT by the following procedure.

   BKDV-101: Set WFM to "AUX" by pressing the [VIDEO OUT] key on the control panel.

   BKDV-200/201: Press SET key on the control panel.

2) Set the display of CF PULSE to "OUT FRM" by the following procedure.

   BKDV-101: Press the [VIDEO OUT] key on the control panel.
   Set CF PULSE display to "OUT FRM" by pressing the [F11] key.

   BKDV-200/201: Press the [SET UP] key on the control panel.
   Select 209 [PULSE SELECT] by turning the search dial. After pressing the [>] key, keep pressing the [^] key until "OUT FRM" appears.

3) Insert an alignment tape (ER2-2), playback the CH-A recorded portion (TC 0 to 20 minutes).

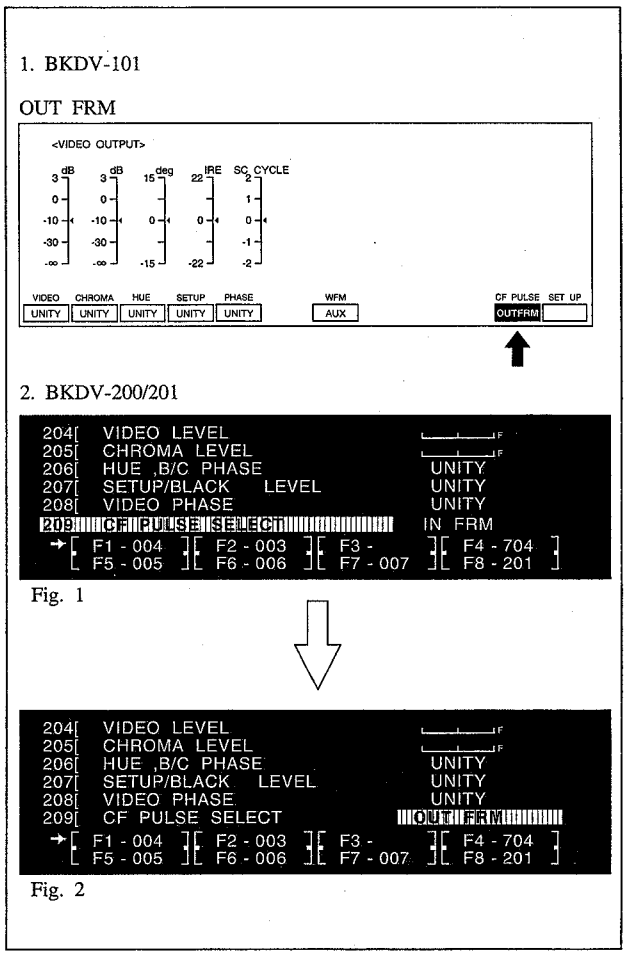


Fig. 1

Fig. 2

Fig. 9-64. Indication of Control Panel Display

4) Adjust the amplitude of the RF envelope center to the maximum by the following procedure. (Fig. 9-66)
BKDV-101: Press keys on the control panel in the following sequence.
TEST , F5 (RF)
Set TRACKING display to "VAR" by pressing the F1 key and turn the control knob on the control panel.
BKDV-200/201: Pull the control knob on the control panel to VARIABLE and turn it.

5) Set the TRACKING display to "FIX" by the following procedure and check to see if the amplitude of the RF envelope center changes.
BKDV-101: Press the F1 key on the control panel.
BKDV-200/201: Press the Tracking Volume.

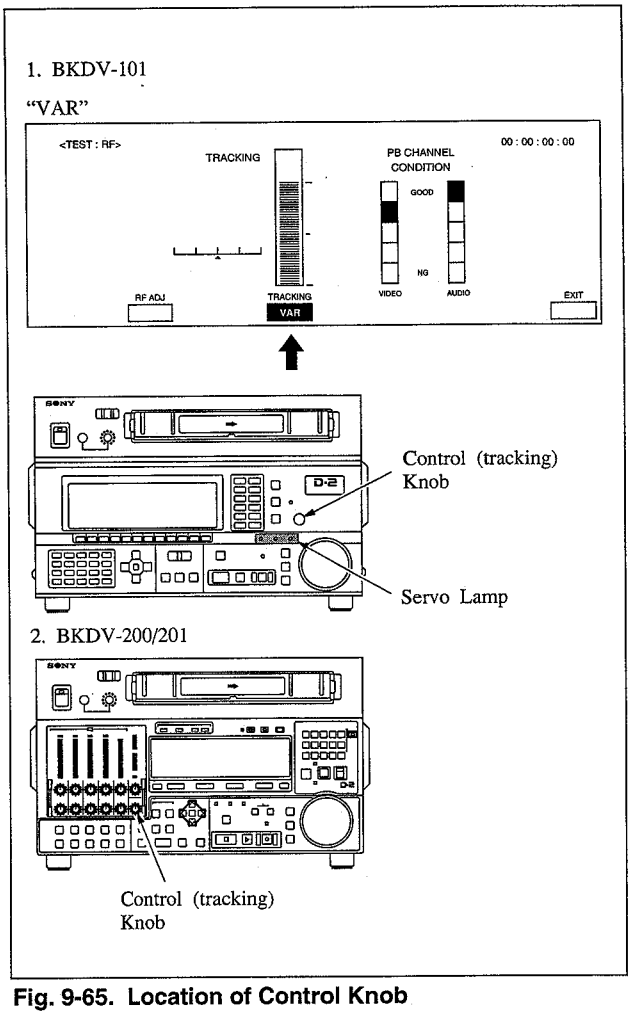


Fig. 9-65. Location of Control Knob

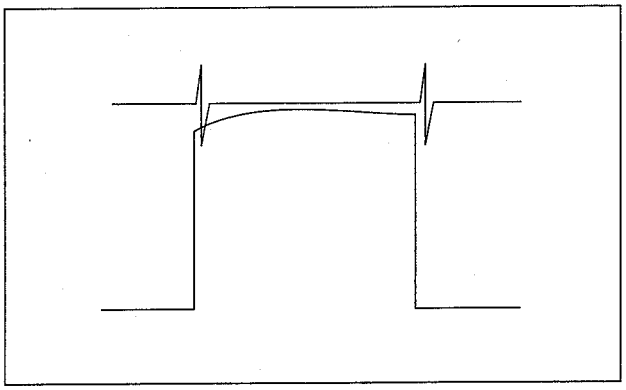


Fig. 9-66. RF Envelope

6) If changing, loosen the two CTL position adjusting screws for 1/4 to 1/2 turn with hexagon wrench screwdriver (Across flat has 2.5 mm). (See Fig. 9-67)

7) Insert the screwdriver into the adjusting hole, move it in the arrow G direction until the center of RF envelope becomes maximum in " FIX" condition.

8) Tighten the two screws that are loosened in step 6).

9) Repeat 4) and 5) and make sure that the RF waveform amplitude does not change.
If the result is NG, repeat 6) - 8).

10) Perform ㉚ PG Phase Adjustment.

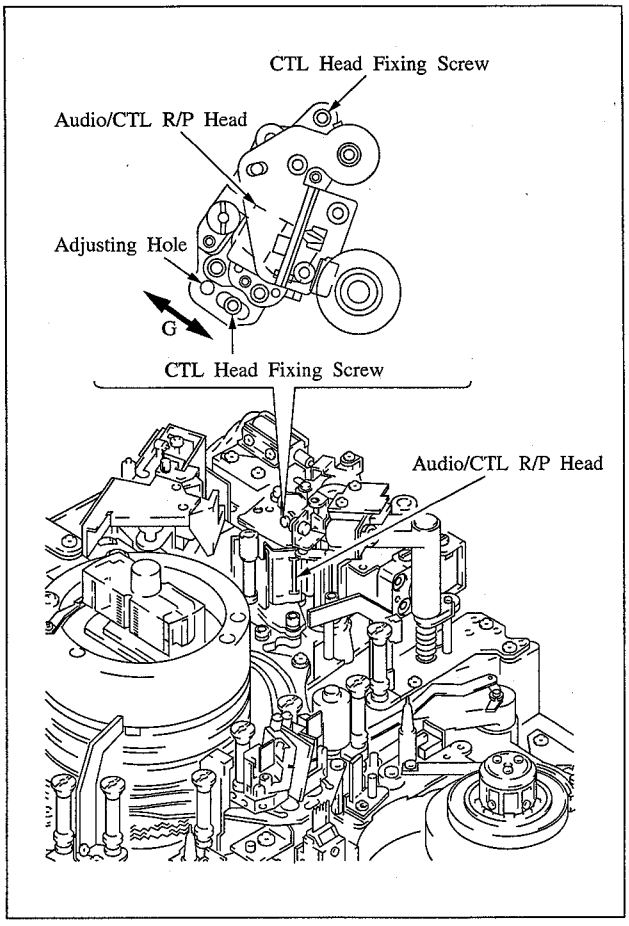


Fig. 9-67. CTL Head Position Adjustment

㉚ PG Phase Adjustment

Preliminary Information

A. Purpose of this adjustment is to maintain tape interchangeability by adjusting the rotary head phase in the direction of track with reference to the recorded pattern of the alignment tape (ER2-2).

B. If the position of the CTL head has been adjusted, be sure to perform this adjustment. Furthermore, be sure to check the position of the CTL head after completing this adjustment.

Check and Adjustment

(1) Connect TP102 (REC, CH-A OUT) of the REC-11 Circuit Board and TP2 of the EN-99 Circuit Board to CH-1 and CH-2 of an oscilloscope, respectively. Connect CF PULSE OUT (BNC connector) of the connector panel to the oscilloscope as trigger input.

(2) Set the CF PULSE display to "OUT FRM" by the following procedure.

BKDV-101: Press the [VIDEO OUT] key on the control panel.
Set CF PULSE display to "IN CF" by pressing the [F11] key.

BKDV-200/201: Press the [SET UP] key on the control panel.
Select 209 [CF PULSE SELECT] by turning the search dial. After pressing the [>] key, keep pressing the [^] key until "IN CF" appears.

(3) Install the alignment tape (ER2-2) and play back its TC 15 to 20 min. portion.

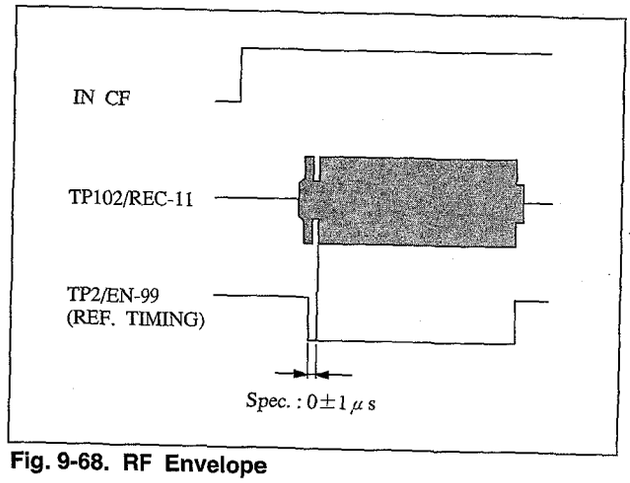


Fig. 9-68. RF Envelope

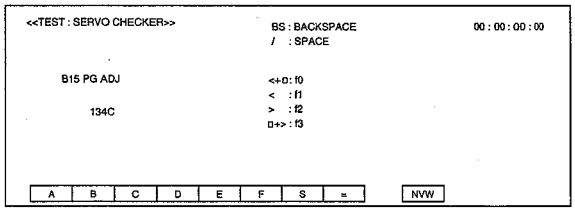
(6) Press the keys on the control panel in the following order.
BKDV-101 : [TEST], [F6](CHECKER) [F2](SV), [F2](B), [1], [5], [SET]
The display changes to the condition shown in the fig. 9-69 (a).
BKDV-200/201: Press keys on the control panel in the following sequence.
1) [SET UP]
2) Select [807 CHECKER MODE] by turning the search dial while pressing [ENTRY] and [ ].
3) Press [>] and press [^] to EXECUTE.
4) Press SHIFT and keep pressing [F3](BOARD) until "< >" on the display changes to "SV".
5) Select ALPHSET "B" by turning the search dial and press [F1](ALPHSET).
6) Press 1.5 and SET in this sequence. ("B15 PG ADJ" will be displayed.)

(7) Check the phases of the RF envelope and REF, TIMING pulse shown in Fig. 9-68.
Specification : 0 ± 1 µsec.

Check the data shown on the display at this time.
Data : NTSC : 06B0~26C0 (HEX)
PAL : 07A0~27B0 (HEX)

i) When both the phase and the data are OK:
Set to STAND BY OFF and reset VTR by the following procedure.
BKDV-101: [F8](=), [0], [SET]
BKDV-200/201: [SHIFT], [F4](=), 0, SET
Then, go to 14).
ii) When the phase does not meet the specification:
Press the [<] and [>] keys on the control panel, and adjust the phases. After adjusting, check the data on the display.
If it is OK, proceed to step 8).
iii) When the data does not meet the specification:
Reset the system, and repeat from step 6).

(a) BKDV-101



(b) BKDV-200/201

Fig. 9-69. Indication of Control Panel Display

(8) Set the unit into the STANDBY OFF mode.

(9) Press the keys on the control panel in the following order.
BKDV-101 : [F12] (EXIT), [F1] (SP), [F10] (NVW), [SET]
Keep pressing the [/] key until "PUSH NVWR SW" appears on the display.

BKDV-200/201 :1) Press [F3] (BOARD) and change the display which was set by 6) to <SP>.

(2) Press [SHIFT] , [F4] (NVW) and SET.

(NVW
A801 xx-xx will be displayed.)

(3) Keep pressing [F3] (/) until "PUSH NVWR SW" is displayed.

The following addresses may be displayed before "PUSH NVWR SW" appears.
"A8D1 XX-XX"
"A8D2 XX-XX"
"A8FE XX-XX"
"A8FF XX-XX".
Check that addresses other than the above are not displayed.
When other addresses are displayed, reset VTR by the procedure of 7) (i)
Return the menu setting to "HOME", and repeat from step 5).

(10) When "PUSH NVWR SW" is displayed, press the S71 (NVWR) switch on the SP-15 board shown in Fig. 9-70, and check that "READY" is displayed.

(11) Press the PLAY button on the control panel, and set to the playback condition.

(12) Check that the specification of step 7) is met.

(13) Press the keys on the control panel in the following order.
BKDV-101 : [F8] (=), [0] , [SET]
BKDV-200/201 : [SHIFT] , [F4] (=) , 0, SET
Return the menu setting from the checker mode to the home condition.

(14) Check the position of the CTL head.
(Refer to step ㉙, CTL Head Position Adjustment.)

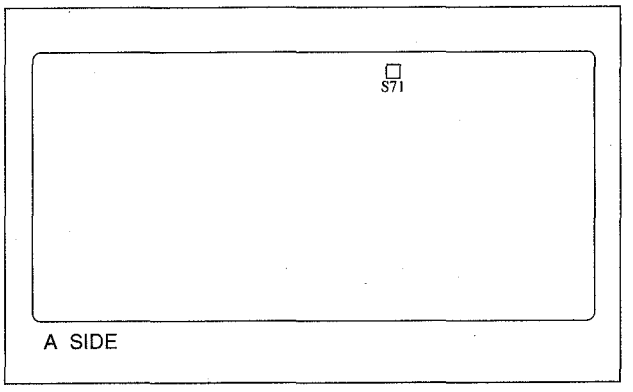


Fig. 9-70. SP-15 Board

㉛ Self Recording/Playback Waveform Check

This procedure is performed to check the condition of the tape-to-video head contact during self record/playback.

(1) Connect WFM OUT to CH-1 of the oscilloscope and press keys on the control panel in the following sequence.

BKDV-101: Press [VIDEO OUT] on the control panel and set WFM to "ENV A/C". As a result, Ach and Cch will be output. (Fig. 9-71)
If WFM is set to "ENV B/D", Bch and Dch will be output. If it is set to "ENV ALL", the A, B, C and D channels will be output simultaneously.

BKDV-200/201: Ach and Cch will be output by pressing [A/C] on the control panel. Bch and Dch will be output by pressing [B/D].
The A, B, C and D channels will be output simultaneously by pressing both [A/C] and [B/D].

Moreover, each channel output are also output from TP102 (A/C ch), and TP101 (B/D ch) on the DT16 board.

(2) Set the function keys on the control panel to the following.

BKDV-101 : [VIDEO IN] → Set [VIDEO] to [INT SG] and [INT SG] to [CB FULL] (Fig. 9-72)

BKDV-200/201: (1) [SET UP]
(2) Select [202 VIDEO INPUT SELECT] by turning the search dial.
(3) Press [>] and keep pressing [∧] until display becomes "INT SG".
(4) Press [<] and [∨] to select [204 VIDEO INPUT INTERNAL SG].
(5) Keep pressing [∧] until the display becomes "CB FULL".

BKDV-101 : Set [AUDIO IN] to [SET UP] and [DA1] ~ [DA4], to [INT SG]

BKDV-200/201: (1) Select [305 DA ALL INPUT SELECT] by pressing [>].
(2) Press [<] and keep pressing [∧] until display becomes "INT SG".

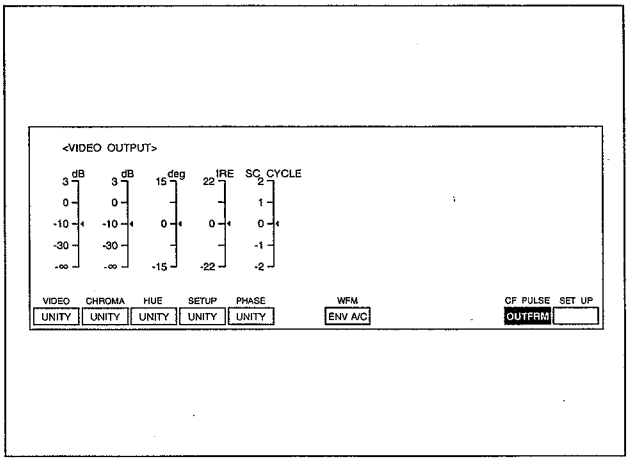


Fig. 9-71.

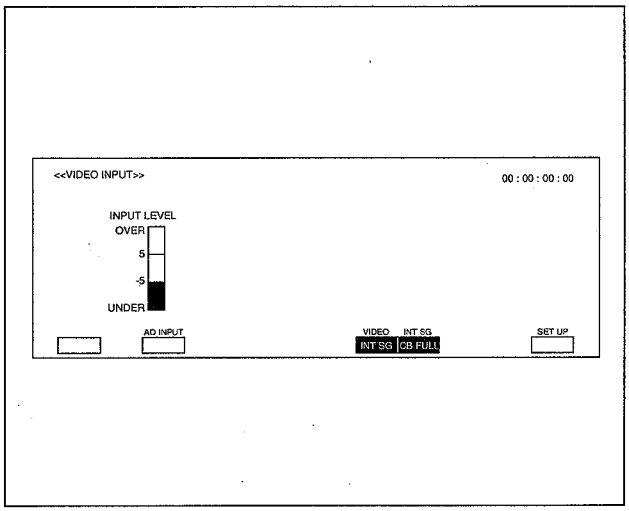


Fig. 9-72.

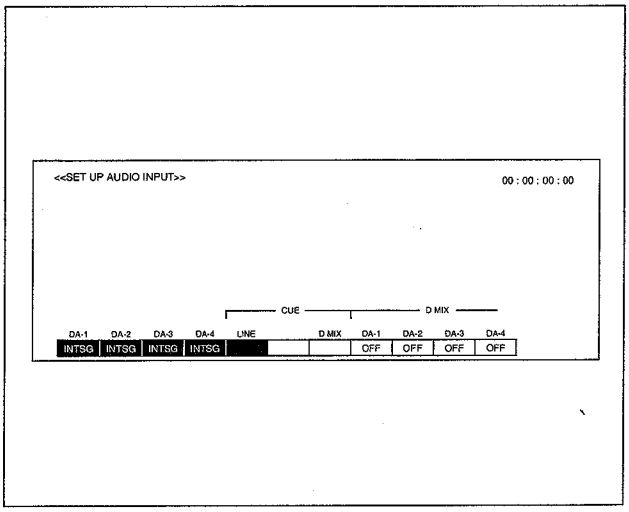


Fig. 9-73.

(3) Input CF PULSE OUT to oscilloscope as trigger signal. TP72 of the SP-15 board can also be used as trigger input.

(4) Set the CF PULSE display to "OUT FRM" by the following procedure.
BKDV-101: Press the [VIDEO OUT] key on the control panel. Set CF PULSE display to "OUT FRM" by pressing the [F11] key.
BKDV-200/201: Press the [SET UP] key on the control panel. Select 209 [CF PULSE SELECT] by turning the search dial. After pressing the [>] key, keep pressing the [^] key until "OUT FRM" appears.

(5) Perform recording on the tape that is prepared for self recording, playback this self-recorded section and check the envelope waveform of the A to D channels.
Make sure that the specification shown in Fig. 9-74 is satisfied.

(6) If the specifications are not OK, perform the adjustments again, according to the adjustment flowchart in 9-2.

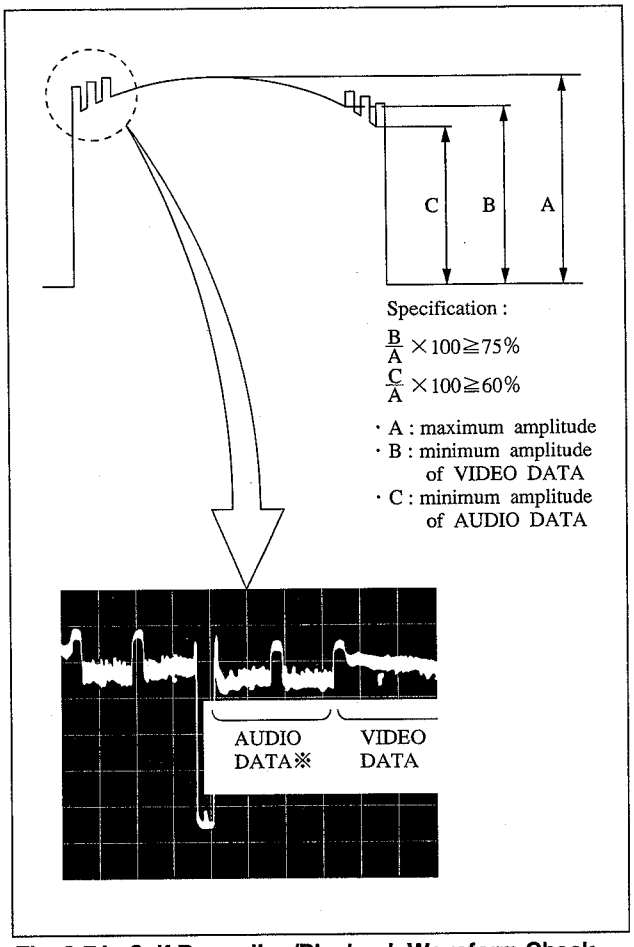


Fig. 9-74. Self Recording/Playback Waveform Check

9-3-4. PROCEDURE 3 T-side Tape Path Adjustment

Preliminary Information

1. A tape curl or wrinkle around T5 guide in PLAY mode can be reduced by adjusting T5 guide. A tape curl or wrinkle around T5 guide in VAR (-1) mode can be reduced by adjusting T6 and T7 guides.
2. A tape curl or wrinkle around T6 and T7 guides in PLAY and VAR (-1) modes should equally diffuse to both guides.

㉜ Playback (+1)

Play back a commercially available tape which is free from damage.

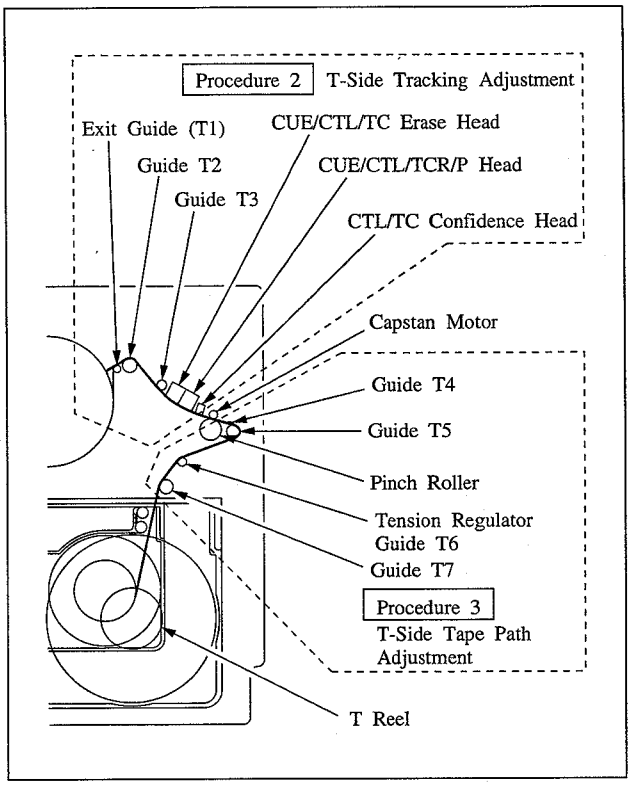


Fig. 9-75. T-side Tape Path System

㉝ T5, T6, and T7 Guides Height Check (+1)

T5 Guide

•••Be sure that there is no tape curl or wrinkle. However there is a possibility to generate wrinkle due to pinch roller at the pinch roller side of T5 guide. At this moment this wrinkle is OK as long as it is free from tape damage.

T6 and T7 Guides

•••As shown in Fig. 9-76 (a), minute tape curl at a side of flange is no problem. However, adjustment is needed to minimize curl or wrinkle.

As shown in Fig. 9-76 (b), it is problem when a tape is folded on flange (It is the condition that a tape runs over the flange.)

Note: Since T7 guide uses a barrel-shaped type roller, a wrinkle around the middle of tape due to a barrel-shaped type can be ignored. However, it is NG that a wrinkle caused by pressing down the tape edge with the flange.

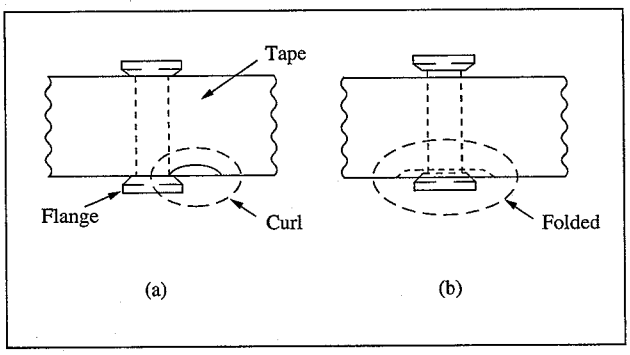


Fig. 9-76. Tape Curl Check

㉞ T5, T6, and T7 Guides Height Adjustment (+1)

If it is NG with step ㉝, turn the flange holder of T5 guide in the counterclockwise direction to make tape curl or wrinkle at the lower flange. Next, turn it in the clockwise direction and stop to tighten the setscrew with tightening torque of 58.8 N·cm (6 kgf·cm) where there is no tape curl or wrinkle.

㉟ Set the unit into VAR (-1) mode from PLAY (+1) mode.

Play back a commercially available tape which is free from damage, in VAR (-1) mode.

㊱ T5, T6 and T7 Guides Tape Path Check (-1)

T5 Guide

•••Check that there is almost no wrinkle and curl on tape.

T6 and T7 Guides

•••As shown in Fig. 9-76 (a), minute tape curl at a side of flange is no problem. However, adjustment is needed to minimize the curl or wrinkle. As shown in Fig. 9-76 (b), it is problem when a tape is folded on flange (the condition that a tape runs over the flange.)

㊲ T6 and T7 Guides Height Adjustment (-1)

Perform the following adjustment when the check in step ㊱ is NG.
Do not adjust the T5 Guide.

(i) When there is a curl or wrinkle at T5 guide

1) Move the T6 and T7 guides in the same direction slowly and evenly until tape neither wrinkles, nor curls at T5.
2) Adjust the T6 and T7 guides in order to decrease the wrinkle or the curl produced by them selves.
3) Repeat the procedures of 1) and 2) until a satisfactory result is obtained.
4) If the result is still NG even after repeating 1) and 2) several times, reverse the flanges which control the T6 and T7 guides. Repeat 1) and 2) again. (Fig. 9-7 (b))
5) If the result is still NG after 4), dismount the T7 guide roller and mount it in the upside-down direction or replace it with a new roller and repeat 1) - 3).
6) Repeat check of step ㉝.
   If the result is NG, repeat step ㉝ to ㊲ again.

(ii) When T5 guide is OK, but there is tape curl or wrinkle at T6 and T7 guides

1) Take the procedures of (i) 2) through 5).
2) Repeat check of step ㉝.
   If the result is NG, repeat step ㉝ to ㊲ again.

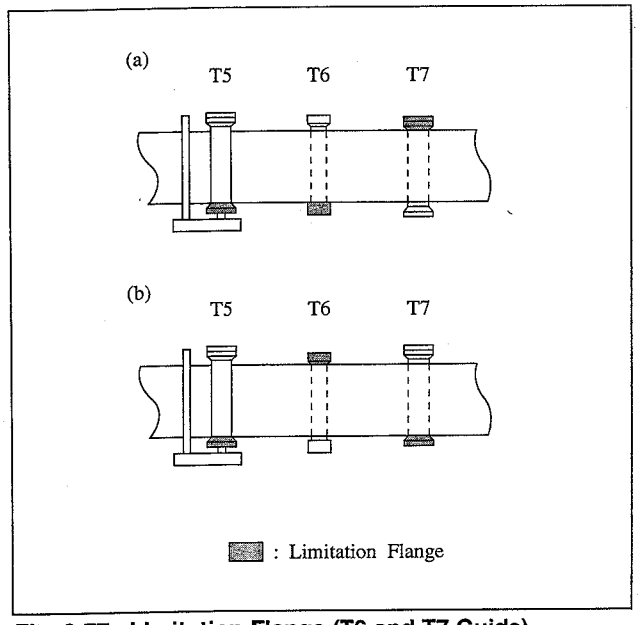


Fig. 9-77. Limitation Flange (T6 and T7 Guide)

㊳ T7 Guide Recovery Check (±1)

Note: Be sure to perform recovery check in both PLAY (+1) and VAR (-1) modes.

Push upper portion and bottom of T7 guide roller from the opposite side of the tape contacting side with bamboo stick as shown in Fig. 9-78 and fold the tape, in other words runs the tape over the flange. In this case tape is folded at the lower flange. Then check that the tape is recovered from folding in 1 or 2 seconds after releasing bamboo stick. (Fig. 9-78)
T6 and T7 guides height adjustment is completed if recovery check is OK.

If the result of a recovery check is NG, repeat from the step ㉝. However, pay attention to the following. If the flange was reversed in the step ㊲, dismount the T7 guide roller and mount it in the upside-down direction or replace it with a new roller.
If the T7 guide roller was dismounted and mounted again in the upside-down direction in the step ㊲, replace the T7 guide roller with a new roller.

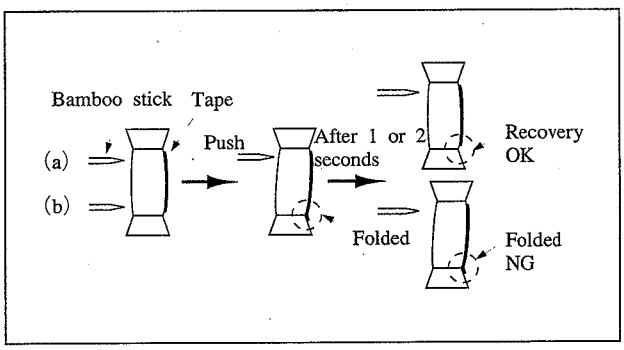
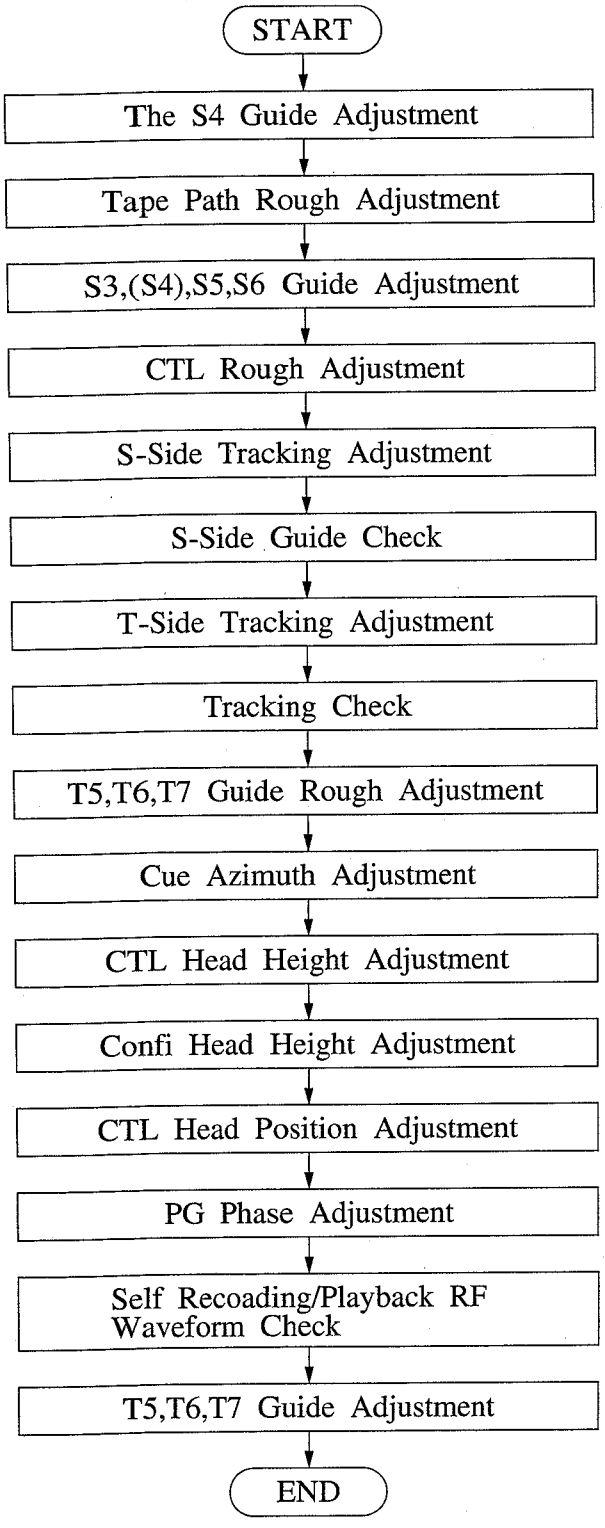


Fig. 9-78. Tape Recovery Check

APPENDIX 1. FLOWCHART FOR TAPE PATH ALIGNMENT



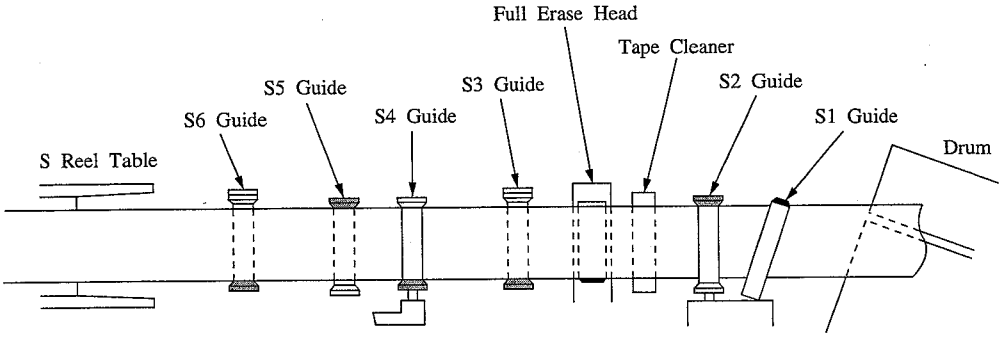
APPENDIX 2. TAPE PATH CHECK QUICK REFERENCE

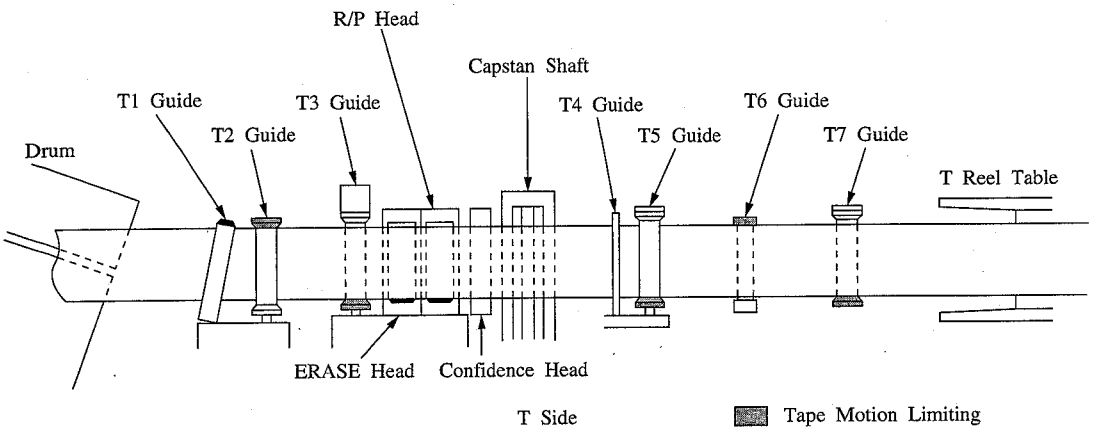
As for quick reference of S1, S2, T1 and T2 guides, refer to Appendix 3.

GUIDE	CHECK		ADJUSTMENT
	MODE	Spec.	
S5/S6	PLAY VAR [–1]	*	Adjust the height of the S5 and S6 guides. **Do not turn the S6 guide by more than ±90° against the jig setting.** If the result is NG after repeating the adjustment several times, dismount the S6 guide roller and mount it in the upside-down direction or replace it with a new roller.
S4	PLAY	0	**Do not adjust this guide because it is the reference guide for tape path adjustment.** If you replace it or if you should change it height, check its height using a jig.
	VAR [–1]	*	
S3	PLAY	0	Adjust S3 guide so that the lower flange is in contact with the lower side of tape edge.
	VAR [1]	*	
T3	PLAY	0	Adjust T3 guide so that the lower flange is in contact with the lower side of tape edge.
	VAR [–1]	*	
T5	PLAY	0	Turn T5 guide so that the lower flange is in contact with the lower side of tape edge.
	VAR [–1]	*	Turn T6 and T7 guides until curl and wrinkle on the T5 guide disappear.
T6/T7	PLAY VAR [–1]	*	Adjust the height of the T6 and T7 guides. If the result is NG after several repetitions, reverse the flanges which control the T6 and T7 guides. If the result is still NG, dismount the S7 guide roller and mount it in the upside-down direction or replace it with a new roller.

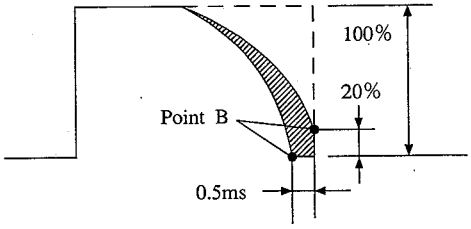
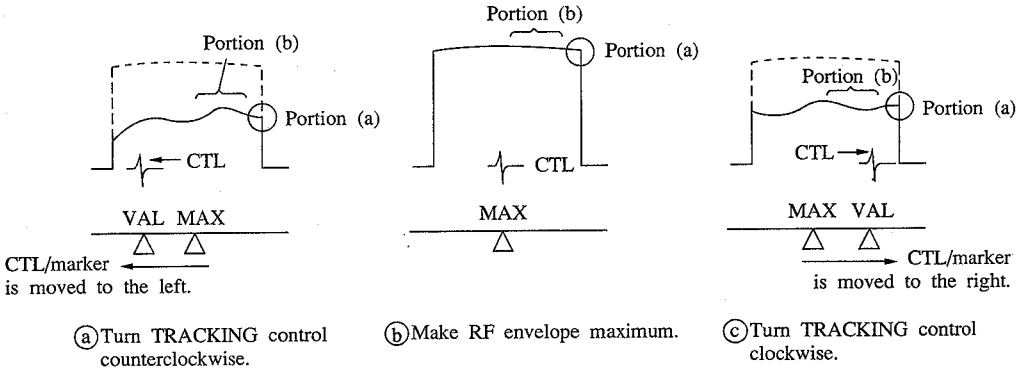
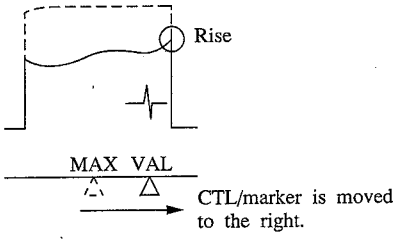
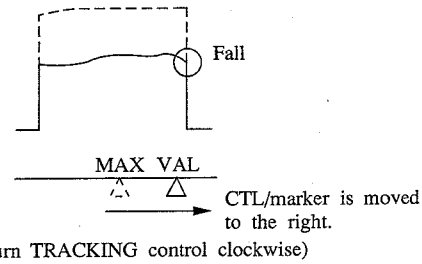
0 : The tape should not curl or wrinkle.
* : Be sure that no curls and wrinkles to damage the tape.

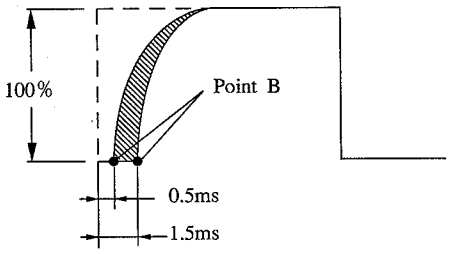
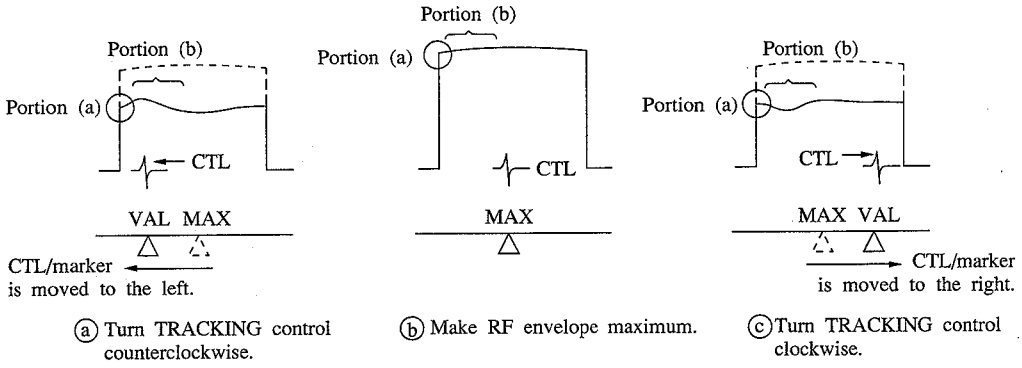
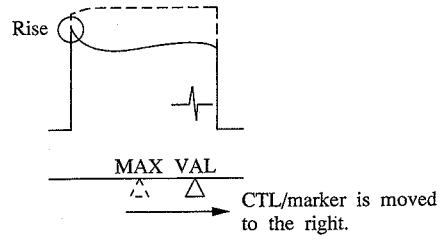
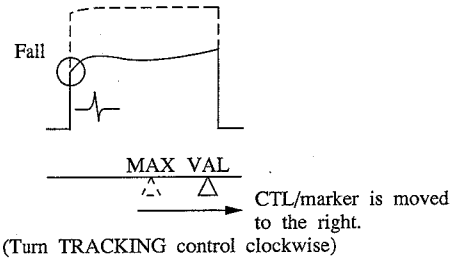
Note: Do not adjust the S4 guide height. It is a reference guide for the tape path adjustment.


Full Erase Head
Tape Cleaner
S5 Guide
S3 Guide
S2 Guide
S6 Guide
S4 Guide
S1 Guide
Drum
S Reel Table
S Side
Tape Motion Limiting


R/P Head
Capstan Shaft
T1 Guide
T3 Guide
T4 Guide
T6 Guide
T2 Guide
T5 Guide
T7 Guide
Drum
T Reel Table
ERASE Head
Confidence Head
T Side
Tape Motion Limiting

APPENDIX 3. S1/S2/T1/T2 GUIDE ADJUSTMENT QUICK REFERENCE

GUIDE	ADJUSTMENT AND KEY POINT
S1	**Check Method: Play back the alignment tape (ER 2-2, TC 0 to 15 min).** Raise S2 guide to the position where RF envelope does not change. At this time Point B should meet the specification. **Specification:** Point B should be in the hatched area in Fig. A-1. **Adjustment:** Adjust the slantness of S1 guide.  **Fig. A-1. S1 Guide Slantness Check**
S2	**Check method: Play back the alignment tape (ER 2-2, TC 0 to 15 min).** 1. Pay attention to portion (a) of RF envelope in Fig. A-2. 2. Set the TRACKING display to "VAR". The portion (a) should move as parallel as possible when control knob on the control panel is turned clockwise. 3. As for portion (b) of RF envelope, the adjustment of S2 guide is unrelated. Therefore disregard here. **Adjustment:** Perform the following adjustment in case of the shape of RF envelope shown in Fig. A-3 or Fig. A-4. In the case of Fig. A-3, lower S2 guide. In the case of Fig. A-4, raise S2 guide.  ⓐTurn TRACKING control counterclockwise. ⓑMake RF envelope maximum. ⓒTurn TRACKING control clockwise. **Fig. A-2. S2 Guide Height Check**  (Turn TRACKING control clockwise) **Fig. A-3. The S2 Guide is too high.**  (Turn TRACKING control clockwise) **Fig. A-4. The S2 Guide is too low.**

GUIDE	ADJUSTMENT AND KEY POINT
T1	**Check Method: Play back the alignment tape (ER 2-2, TC 0 to 15 min)** Raise T2 guide to the position where RF envelope does not change any more. At this time Point B should meet the specification. **Specification:** Point B should be in the hatched area in a Fig. A-5. **Adjustment:** Adjust the slantness of T1 guide.  **Fig. A-5. T1 Guide Slantness Check**
T2	**Check method: Play back the alignment tape (ER 2-2, TC 0 to 15 min)** 1. Pay attention to portion (a) of RF envelope in Fig. A-6. 2. Set the TRACKING display to "VAR". The portion (a) should move as parallel as possible when control knob on the control panel is turned clockwise or counterclockwise. 3. As for portion (b) of RF envelope, the adjustment of T2 guide is unrelated. Therefore disregard here. **Adjustment:** Perform the following adjustment in case of the shape of RF envelope shown in Fig. A-7 or Fig. A-8. In the case of Fig. A-7, lower T2 guide. In the case of Fig. A-8, raise T2 guide.  ⓐ Turn TRACKING control counterclockwise. ⓑ Make RF envelope maximum. ⓒ Turn TRACKING control clockwise. **Fig. A-6. T2 Guide Height Check**  (Turn TRACKING control clockwise) **Fig. A-7 T2 guide is too high.**  (Turn TRACKING control clockwise) **Fig. A-8 T2 guide is too low.**

APPENDIX 4. SIMPLIFIED CHECK FOR TRACKING

This check is to confirm the tracking easily. Use this for quick tracking check.
In order to check the tracking more correctly, perform the tracking check shown in the main chapter.

Check Procedure

BKDV-101

1. Obtain the signals from the REC board as below.
   (1) Connect a probe (oscilloscope) to TP101 (REC CH-A OUT) on the REC board.
   (2) Connect the GND pin of an oscilloscope to the shielding case on the REC board.
   (3) Connect the CF PULSE OUT pin (BNC connector) on the connector panel as a trigger input.
2. Press the keys on the control panel in the order below.
   VIDEO OUT, F11
   The CF PULSE display is set to "OUT FRM".
3. Install an alignment tape (ER2-2) and play back the TC 15 to 20 min on the alignment tape.
4. Press the keys on the control panel in the order below.
   TEST, F5 (RF), F1
   The TRACKING display is set to "VAR".
5. Turn the adjustment control on the control panel and adjust so that the playback RF amplitude is maximum.
6. Confirm that the RF waveform satisfies the specification in the Fig. A-10. If not, perform the tracking adjustment.
7. Press the F1 key to return to the "FIX' display.

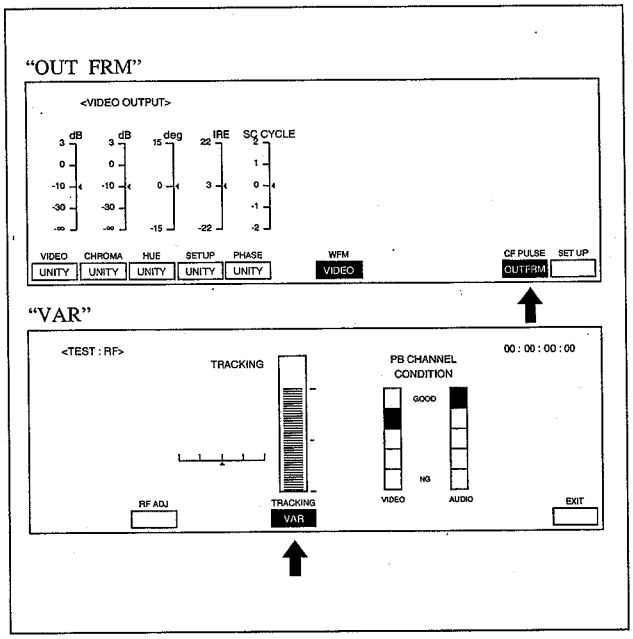


Fig. A-9. EL Panel Display (BKDV-101)

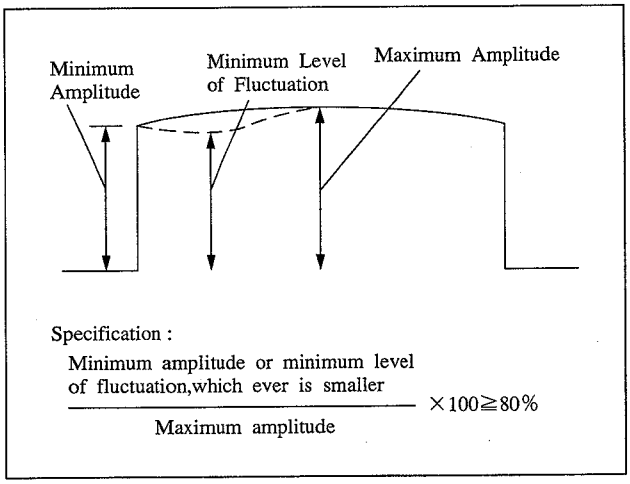


Fig. A-10. Tracking Check

BKDV-200/201

1. Obtain the signals from the REC board as below.
   (1) Connect a probe (oscilloscope) to TP101 (REC CH-A OUT) on the REC board.
   (2) Connect the GND pin of an oscilloscope to the shielding case on the REC board.
   (3) Connect the CF PULSE OUT pin (BNC connector) on the connector panel as a trigger input.
2. Press the keys on the control panel in the order below.
   (1) Press the SET UP key to enter the Menu Mode.
   (2) Select No. 209 CF PULSE SELECT by pressing the SEARCH DIAL key or the ∧ and ∨ key. (Fig. A-11, Fig. 1)
   (3) Set SELECT mode by pressing the > key.
   (4) Select "OUT FRM" by pressing the ∧ key. (Fig. A-11, Fig. 2)
   (5) Set ITEM SELECT mode by pressing the < key.
3. Install an alignment tape (ER2-2) and play back the TC 15 to 20 min on the alignment tape.
4. Set "VTR" mode by pulling the TRACKING control knob.
5. Adjust the Playback RF amplitude by turning the TRACKING control knob so that it rests at the maximum value.
6. Confirm that the RF waveform satisfies the specification in the Fig. A-10. If not, make a tracking adjustment.
7. Push the TRACKING control knob to end the "VAR" mode.

Fig. 1

Fig. 2

Fig. A-11. FL Panel Display (BKDV-200/201)

APPENDIX 5. HOW TO USE CLEANING CASSETTE

When using any one of the cleaning cassettes below, note the following cautions.

DCS-12CL (Standard Product)
DCM-12CL (Standard Product)

1. Do not use cleaning cassette over two or three seconds at a time.
   Continuous use more than three seconds results in extreme degradation of the rotary head life.

[How to use the cleaning cassette]
1) Press the PLAY button on the control panel, immediately after threading the cleaning cassette into the VTR.
2) Directly press "EJECT" button after two or three seconds of playback. Never press the STOP button. (for minimizing the head-to-tape contact time.)

2. Never use the cleaning cassette in any mode other than the play mode. Be absolutely careful not to use it in the fast-forward or rewind mode.
   The cleaning cassette can be used only once. Never use it again by rewinding.

3. The cleaning cassette can be used only when the head is clogged. (Refer to "clogging check".)
   Never use it in any other cases.

*1 HEAD CLOGGING CHECK METHOD

Perform self recording/playback and check the RF envelope level of each channel (4 channels).
If any one level of them is extremely low as shown in Fig. A-12, clog might have occurred.
(As for the connection with oscilloscope, refer to *3 "RF Envelope Waveform Check" in the latter page.)

In this case, clean the head surface using a cleaning cloth moistened with alcohol, then wipe it with dry cloth as described in the manual. In emergency, however, the cleaning cassette is recommended.
If these levels do not recover to the normal condition at all after cleaning or using the cleaning tape, observe the head surface with the headtip microscope as shown in Fig. A-13.
If the head surface is still stained with magnetic particles, (or no headtip microscope is available), clean the head surface again.

If the head surface is not stained, check that head projection is 30 μm or more using a eccentricity adjustment tool (refer to Section 5. Head Projection Check in maintenance manual.)
If the head projection is less than 30 μm, replace the drum.

If within the range, there may be some troubles in the RF system. Check the trouble of the RF adjustment with reference to "RF Signal System Adjustment" in the manual. Also check the connectors (CN451 to CN454, CN461 to CN464 and CN481 to CN484) from drum, the open harness on DR-132 board, the defective soldering (W1 to W4), and the defective of REC-11 or EQ-29 board.

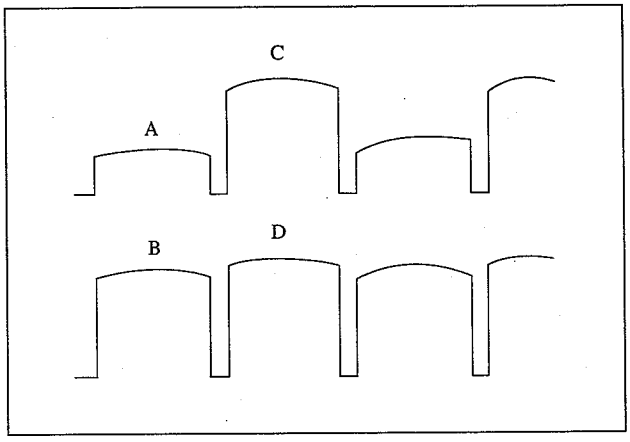


Fig. A-12. CH-A Clog Condition

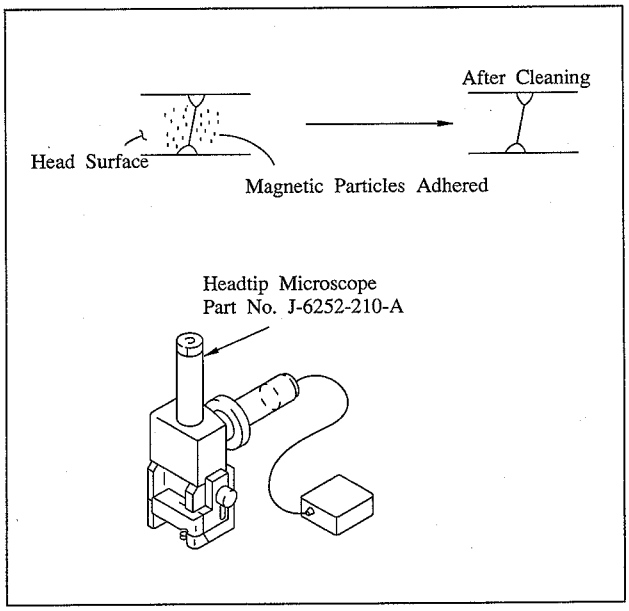


Fig. A-13. Head Cleaning

*2 CHANNEL CONDITION CHECK METHOD

Press keys on the control panel in the order as shown below.
(The error condition can be checked.)
[TEST] → [F5] (RF) → [F3] (RF ADJ)

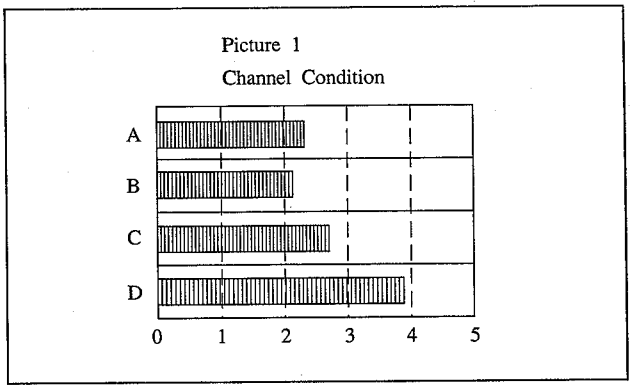


Fig. A-14. Channel Condition Check

*3 RF ENVELOPE WAVEFORM CHECK METHOD

1) Connect the oscilloscope to the WFM on the connector panel using the cable with BNC connectors.
2) Connect the CF PULSE OUT to the oscilloscope as a trigger input through the cable with BNC connectors.
   TP72 on SP-15 board can be used as trigger input.
3) Set the CF PULSE display to "OUT FRM" by the following procedure.
   BKDV-101: Press the [VIDEO OUT] key on the control panel.
   Set CF PULSE display to "OUT FRM" by pressing the [F11] key.
   BKDV-200/201: Press the [SET UP] key on the control panel.
   Select 209 [CF PULSE SELECT] by turning the search dial. After pressing the [>] key, keep pressing the [^] key until "OUT FRM" appears.
4) Press keys on the control panel in the following sequence.
   BKDV-101: Press [VIDEO OUT] key then [F7] key to set the display of the WFM to ENV A/C. At this time, the envelope of CH-A and CH-C can be checked. Similarly, the envelope of CH-B and CH-D can be checked by setting the display on the WFM to ENV B/D.
   BKDV-200/201: The envelopes of Ach and Cch can be checked by pressing the [A/C] key.
   The envelopes of Bch and Dch can be checked by pressing the [B/D] key.

APPENDIX 6. S AND T REEL TABLES HEIGHT ADJUSTMENT

This adjustment is not necessary in usual tape path adjustment. If tape heavily touches the reel flange, adjust the reel table height referring to "Reel Motor Replacement" in Maintenance Manual Vol. 1.
However, if the tape touches the flange even after height adjustment, go to the following adjustment.

Adjustment

1. Loosen the setscrews A and B using a hexagon wrench (diagonally 2 mm).
2. While pushing the reel table lightly in the direction of the arrow shown in the figure, adjust the height by turning the setscrew C using a hexagon wrench (diagonally 1.5 mm) so that the tape runs without contacting the flange surface.
3. Tighten the setscrews A and B.

Note: If the tape touches the reel flange even after this adjustment, check the followings.

(1) Whether or not one of the reel flanges of the tape cassette is deformed abnormally.
(2) Whether or not the sheet of the reel table is deformed or whether some foreign material is stuck to it.
(3) Whether or not an unusual noise is generated by the reel motor.

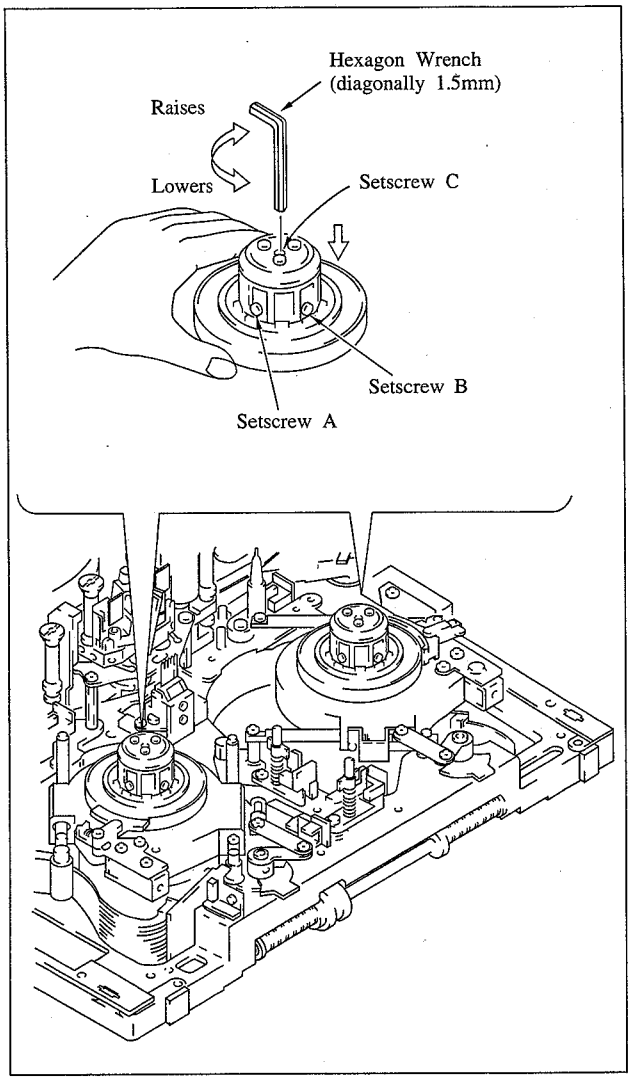


Fig. A-15. S/T Reel Table Height Adjustment

SP00962

SERVICE MANUAL
S E G

SONY

DIGITAL VIDEOCASSETTE RECORDER

DVR-20/C20/28
DVR-20P/28P

SUPPLEMENT-5

SUBJECT

Addition and Replacement of Documents

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SECTION 3 TEST MENU

APPLICABLE MANUALS/SERIAL NUMBERS

DVR-20 (UC) MAINTENANCE MANUAL (VOL-1)
1st Edition
1st Edition (Revised-1 to Revised-4)

DVR-20P (EK, UC) MAINTENANCE MANUAL (VOL-1)
1st Edition
1st Edition (Revised-1 to Revised-3)

DVR-C20 (UC) MAINTENANCE MANUAL (VOL-1)
1st Edition
1st Edition (Revised-1 to Revised-2)

DVR-28 (UC) MAINTENANCE MANUAL (VOL-1)
1st Edition
1st Edition (Revised-1 to Revised-3)

DVR-28P (EK, UC) MAINTENANCE MANUAL (VOL-1)
1st Edition
1st Edition (Revised-1 to Revised-3)

Above manuals are packed with the following machines.
DVR-20 (UC): #10001 to #11399
#90001 to #90099
DVR-20P (EK, UC): #10001 to #11099
DVR-C20 (UC): #10001 to #10499
DVR-28 (UC): #10001 to #11099
DVR-28P (EK, UC): #10001 to #10999

D-2

Composite Digital
MAINTENANCE MANUAL

DVR-20/C20/28 (UC)
DVR-20P/28P (EK, UC)
9-967-408-09

Sony Corporation
Broadcast Products Group

Printed in Japan
1992. 5 11
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Published by B&P Marketing Group

SAFETY CHECK-OUT

After correcting the original service problem, perform the following safety checks before releasing the set to the customer:

Check the metal trim, "metallized" knobs, screws, and all other exposed metal parts for AC leakage. Check leakage as described below.

LEAKAGE TEST

The AC leakage from any exposed metal part to earth ground and from all exposed metal parts to any exposed metal part having a return to chassis, must not exceed 3.5mA. Leakage current can be measured by any one of three methods.

1. A commercial leakage tester, such as the Simpson 229 or RCA WT-540A. Follow the manufacturers' instructions to use these instruments.
2. A battery-operated AC milliammeter. The Data Precision 245 digital multimeter is suitable for this job.
3. Measuring the voltage drop across a resistor by means of a VOM or battery-operated AC voltmeter. The "limit" indication is 5.25V so analog meters must have an accurate low-voltage scale. The Simpson 250 and Sanwa SH-63Trd are examples of a passive VOM that is suitable. Nearly all battery operated digital multimeters that have a 20V AC range are suitable. (See Fig. A)

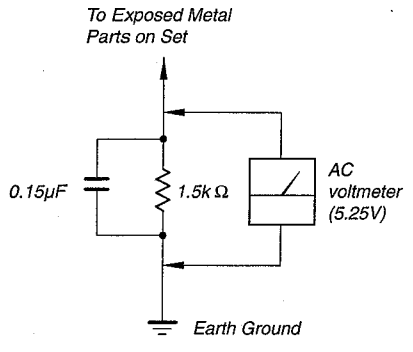

Fig. A. Using an AC voltmeter to check AC leakage.

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(Section 16 will be available as a Supplement.)

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SECTION 3
TEST MENU

FOR BKDV-101

3-1. OUTLINE

The TEST menu is an important item when maintaining, checking, and repairing the unit and is displayed when the control panel [TEST] key is pressed.
Five of the seven TEST menus (OP TIME menu, RF menu, CHECKER menu, PROC menu and MULTI menu) are described in this section.
For other TEST menus, refer to the Operation Manual.

How to Enter Menu

Press the keys on the control panel in the following sequence.

[TEST] : The TEST menu is selected.
([F1] to [F8] : Select the desired menu.)

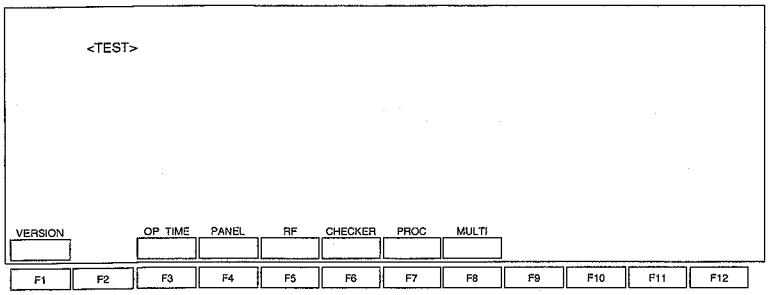


Fig. 3-1. Test Menu Display

Function key	Display	Function
[F1]	VERSION	Displays ROM versions of the internal circuit boards.
[F3]	OP TIME	Displays operating hours of the VTR.
[F4]	PANEL	Checks control panel.
[F5]	RF	Checks RF output.
[F6]	CHECKER	Checks servo system and tape path system.
[F7]	PROC	System EE mode
[F8]	MULTI	Multi-loop test

Table 3-1. Function of Test Menu

3-2. OP TIME MENU

The OP (OPERATION) TIME menu displays the operating hour, head drum rotating hour, tape traveling hour and tape threading / unthreading time.
When performing the periodic check of the unit, check and use the operation hour and the time of cassette threading / unthreading operations.

How to Enter and Exit the Menu

Press the keys on the control panel in the following sequence.
[TEST] : TEST menu is selected.
[F3] (OP TIME) : OP TIME menu is selected.
(Fig. 3-2 OP TIME Menu Display appears on the EL panel.)
[F12] (EXIT) : The OP TIME menu is terminated and returns to TEST menu.

Explanation of Display

OPERATTION : Operating hour is displayed.
DRUM RUNNING : Drum running hour and resettable drum running hour are displayed.
HEAD : Head working hour and resettable head working hour are displayed.
TAPE TRAVEL : Tape traveling hour is displayed. (calculated in tape length)
THREADING : The number of cassette threading / unthreading operations are displayed.
(Cassette threading / unthreading is counted as one operation.)

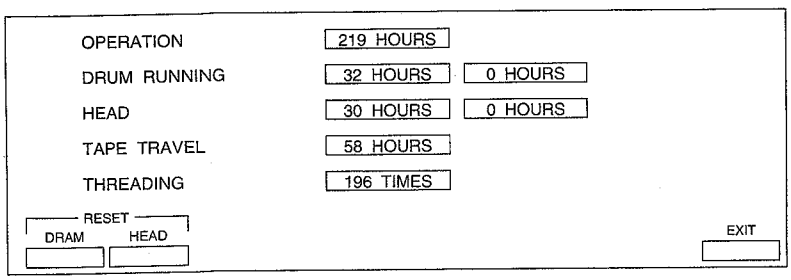


Fig. 3-2. OP TIME Menu Display

The display shows both total hour and resettable time for drum running hour and head working hour.
Press [F1] key while holding down the [F] key to reset the right hand value of drum running hour.
Press [F2] key while holding down the [F] key to reset the right hand value of the head working time.

3-3. RF MENU

3-3-1. RF Menu Key Function Directories

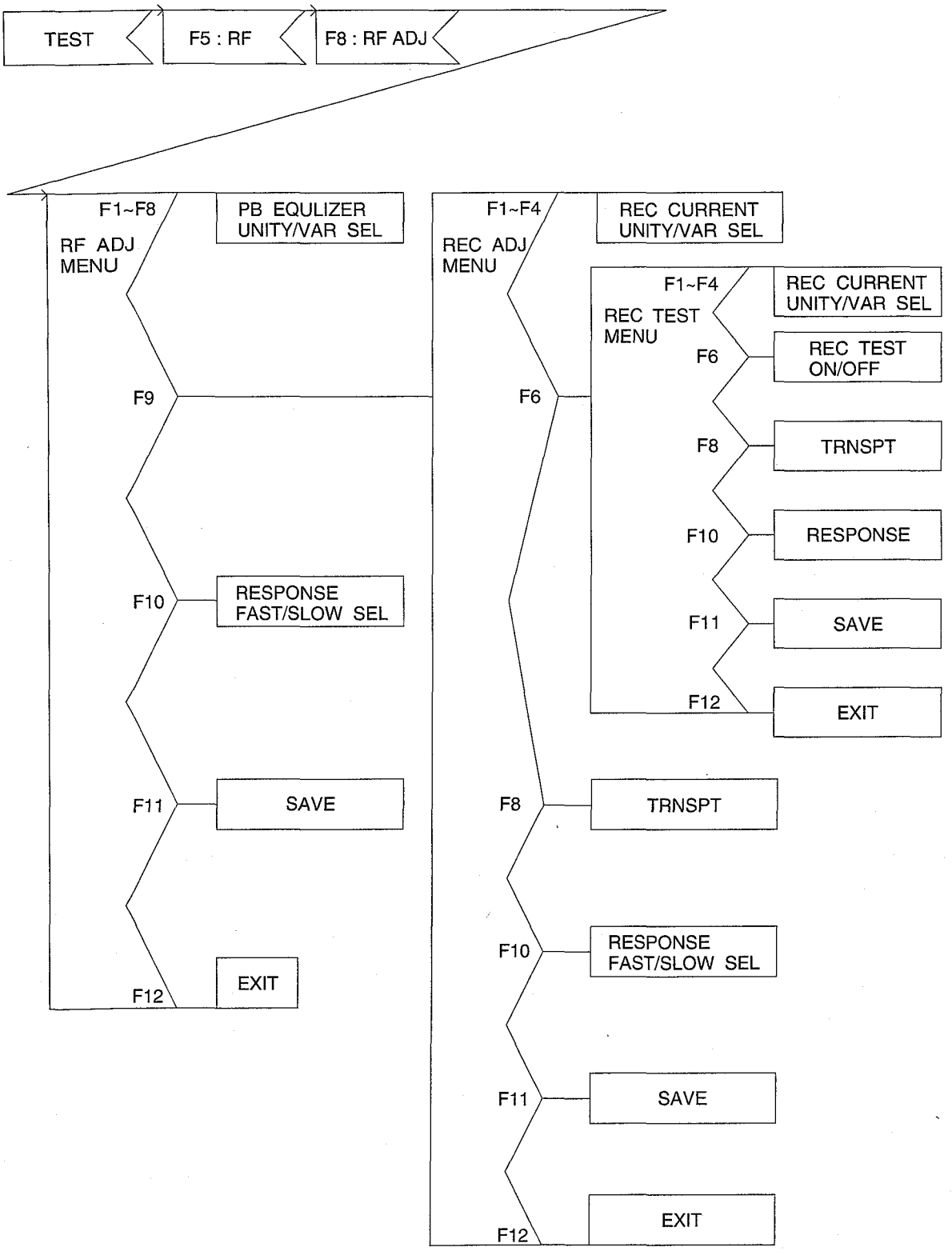


Table 3-2. RF Menu Key Function Directories

3-3-2. RF Menu

This menu is used for checking and adjusting the RF signal system.

Note : The default value is set when shipped from factory. If the equipment is not adjusted correctly with this menu, good quality video and audio outputs may not be obtained. For details, refer to each section of adjustment.

The way into and out of the menu

Press the keys on the control panel in the following sequence.

[TEST] : TEST menu is selected.
[F5] : RF menu is selected. (Fig. 3-3 RF Menu is displayed on the EL panel.)
([F1], [F2], [F4], [F5], [F8] : Select the desired menu.)
[F12] : The RF menu is terminated and returns to the TEST menu.

Explanation of Display

TRACKING : This is an RF meter.
PB CHANNEL CONDITION : Error rate of video and audio channels are displayed in 5 levels.

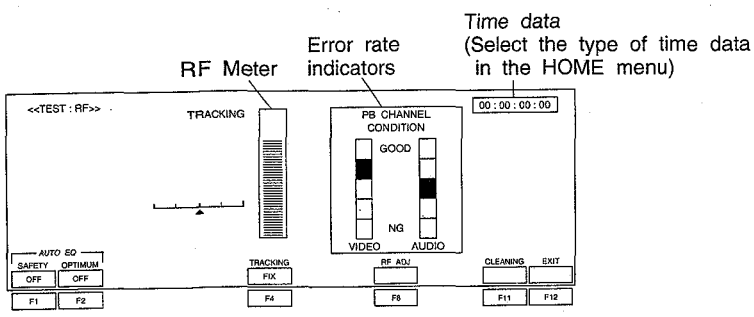


Fig. 3-3 RF Menu Display

Function key	Display	Function	Setting
[F1]	SAFETY	Auto equalization function is maintained.	ON / OFF
[F2]	OPTIMUM	Optimum equalization according to the head condition is performed.	ON / OFF
[F4]	TRACKING	Tracking Control	FIX / VAR / AUTO
[F8]	RF ADJ	RF ADJ menu	—
[F11]	CLEANING	Cleaning Roller Control	ON/OFF
[F12]	EXIT	Returns to TEST menu	—

Table 3-3. Function of RF Menu

F1 : SAFETY mode
F2 : OPTIMUM mode

Automatic Equalization

The automatic equalization function corrects changes in equalization parameters which may be caused by certain types of tape or by deterioration of the heads. Two modes are available : SAFETY mode, in which channels whose error rate has become high are corrected during playback, and OPTIMUM mode, in which equalization is performed using a reference tape.

To maintain the automatic equalization function (SAFETY mode)

Press F1 (SAFETY) key to turn this mode on. The error rate of each channel is continuously monitored during playback and equalization is automatically performed when the channel condition of the heads exceeds 2. (The PLAY indicator is lit during the automatic equalization process.)
SAFETY mode remains on until F1 (SAFETY) key is pressed again to select OFF.

To perform optimum equalization according to the head condition (OPTIMUM mode)

① Insert an alignment tape.
② Press F2 (OPTIMUM) key to select ON pressing F key in the data set section.
③ Press the EXECUTE button to perform equalization.
The VTR automatically starts playback and the PLAY lamp blinks during the automatic equalization process.
When equalization obtains the optimum level, the PLAY lamp remains lit and the tape is played back normally.

To write the optimum value as a FIX value to NOVRAM

Stop tape running and set to STANDBY OFF mode. Press F8 (RF ADJ) key and then, press F11 (SAVE) key.

F4 : Tracking Control

Automatic Edit Tracking

As the VTR uses the DT heads as PB heads, it is unnecessary to adjust tracking during playback.
However, the tracking of the recording heads can be automatically corrected when tracking on the tape to be edited is not good, such as in the case of tape recorded on another DVR-20 is used.

① Press F4 (TRACKING) key to select AUTO.
② Perform editing.
("TRACKING AUTO" is displayed on the HOME menu.)
Tracking is automatically adjusted before the tape reaches the IN point during editing.
The SERVO lamp is lit while adjustments are being made.
When tracking adjustment is impossible, a warning message is displayed and the original tracking position is resumed.

To perform edit tracking temporarily

Press F in the data set section together with the PLAY button.
Regardless of the setting of F4 (TRACKING) key, autoçmatic tracking can be performed in any mode.
"TRACK AUTO" is displayed on the HOME menu during automatic edit tracking.
When adjustment has been completed, "TRACK ADJ" is displayed.

Manual Tracking Adjustment

Adjust tracking while referring to the RF meter.
The RF meter indicates the level of the playback RF signals on channel A (recorded with recording head A).

① Press F4 (TRACKING) key to select VAR.
② Turn the control to adjust tracking.
Turn the control until the RF meter indicates the maximum level.
The pointers on the tracking scale show the control position.
When the VTR is used after tracking, keep F4 at the VAR setting.

F8 : RF ADJ menu

When pressing this key, RF ADJ menu appears on the EL Panel.
Refer to Section 3-3-3. RF ADJ menu for details.

F11 : Cleaning Roller Controller

If heads are clogged, error rate indicators indicate NG.
In this case, keep F11 (CLEANING) key depressed to clean the head.
After cleaning, be sure that the error rate indicators indicate GOOD.
For details, refer to Section 2-10. Cleaning Procedures for Head Clogging.

F12 : EXIT

When pressing this key, the RF menu is terminated and returns to the TEST menu.

3-3-3. RF ADJ Menu

How to Enter and Exit the Menu

Press the keys on the control panel in the following sequence.
[TEST] : TEST menu is selected.
[F5] (RF) : RF menu is selected.
[F8] (RF ADJ) : RF ADJ menu is selected. (Fig. 3-4 RF ADJ menu is displayed on the EL panel.)
([F1] to [F11] : Select the desired menu.)
[F12] (EXIT) : The RF ADJ menu is terminated and returns to the RF menu.

Explanation of Display

PB PHASE : Phase adjustment data of each channel of the PB equalizer is displayed in hexadecimal notation.
PB AMPLITUDE : PB amplitude adjustment data of each channel is displayed in hexadecimal notation.
CHANNEL CONDITION : Error rate of each channel is displayed.

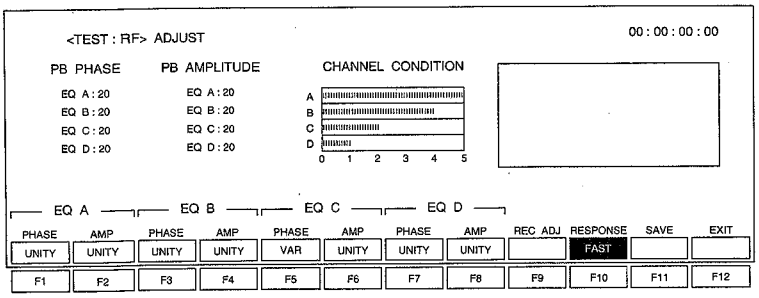


Fig. 3-4 RF ADJ Menu Display

Function key	Display	Function	Setting
[F1]	EQ A PHASE	Equalizer CH-A Phase Adjustment	UNITY / VAR
[F2]	EQ A AMP	Equalizer CH-A Frequency Response Characteristic Adjustment	UNITY / VAR
[F3]	EQ B PHASE	Equalizer CH-B Phase Adjustment	UNITY / VAR
[F4]	EQ B AMP	Equalizer CH-B Frequency Response Characteristic Adjustment	UNITY / VAR
[F5]	EQ C PHASE	Equalizer CH-B Frequency Response Characteristic Adjustment	UNITY / VAR
[F6]	EQ C AMP	Equalizer CH-C Frequency Response Characteristic Adjustment	UNITY / VAR
[F7]	EQ D PHASE	Equalizer CH-D Phase Adjustment	UNITY / VAR
[F8]	EQ D AMP	Equalizer CH-D Frequency Response Characteristic Adjustment	UNITY / VAR
[F9]	REC ADJ	Selection of REC ADJ Menu	—
[F10]	RESPONSE	Error Rate Display Mode Selection	FAST / SLOW
[F11]	SAVE	Saving RF Control Data	—
[F12]	EXIT	Termination of RF ADJ Menu	—

Table 3-4. Function of RF ADJ Menu

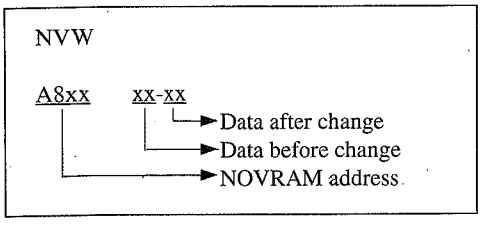
[F1] : Equalizer CH-A Phase Adjustment
[F2] : Equalizer CH-A Frequency Response Characteristic Adjustment
[F3] : Equalizer CH-B Phase Adjustment
[F4] : Equalizer CH-B Frequency Response Characteristic Adjustment
[F5] : Equalizer CH-C Phase Adjustment
[F6] : Equalizer CH-C Frequency Response Characteristic Adjustment
[F7] : Equalizer CH-D Phase Adjustment
[F8] : Equalizer CH-D Frequency Response Characteristic Adjustment
To adjust a specific channel : Select the channel desired by pressing [F1] to [F8].
Select UNITY / VAR to VAR. Make adjustment.
(Pressing [F1] key to [F8] key again, selects again the channel.)
For details, refer to Section 13. RF Signal System Adjustment.

[F9] : REC ADJ
When pressing this key, ADJUST-REC menu is selected.
For details, refer to Section 3-3-4. ADJUST-REC Menu.

[F10] : RESPONSE
This key is used for selecting a response speed for the CHANNEL CONDITION display (error rate indication of each channel).
Whenever this key is pressed, response speed setting is changed from "FAST" to "SLOW" or vice versa.

[F11] : SAVE
When this key is pressed, the control data set in the menu is transferred to the nonvolatile memory (NOVRAM).
Data changed by the equalizer phase adjustment and the equalizer frequency response characteristic adjustment can not be transfer to NOVRAM as it is.
The new values are set for UNITY, so the data is transferred.
Data transfer is performed by the following procedure.

1. Press [F11] (SAVE) key. The following message appears in the message area at the right side of the EL panel.



2. Push [/] key until the message "PUSH NVWR SW" appears in the message area.
   To cancel it during the operation, press [SET] key.
3. After the message "PUSH NVWR SW" appears in the message area, press the NVWR SW (S71) on SP-15 or SSP-07 board.
   Data transfer begins.
4. When the data has been transferred, "READY" appears in the message area.
5. Data has been transferred. When the unit is powered ON again, UNITY setting is changed.

[F12] : EXIT
When pressing this key, the RF ADJ menu is terminated and returns to the RF menu.

3-3-4. ADJUST-REC Menu

How to Enter and Exit the Menu

Press the following keys on the control panel.

[TEST] : TEST menu is selected.
[F5] (RF) : RF menu is selected.
[F8] (RF ADJ) : RF ADJ menu is selected.
[F9] (REC ADJ) : REC ADJ menu is selected.
Fig. 3-5. ADJUST-REC menu is displayed on the EL panel.
([F1] to [F11] : Select the desired menu.)
[F12] (EXIT) : The ADJUST-REC menu is terminated and returns to the RF ADJ menu.

Explanation of Display

REC CURRENT : Recording current adjustment data of each channel is displayed in hexadecimal notation.
CHANNEL CONDITION : Error rate of each channel is displayed.
MESSAGE INDICATION : The message corresponding to the equipment state is displayed.

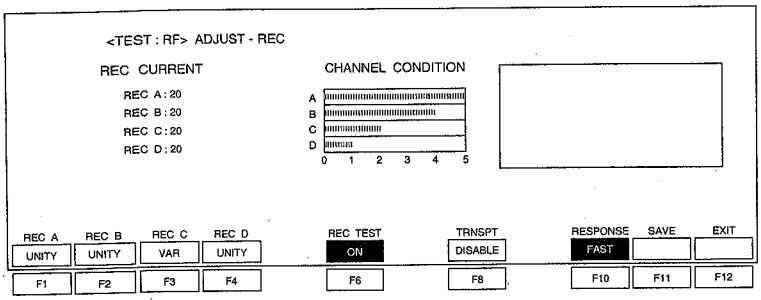


Fig. 3-5. ADJUST-REC Menu Display

Function key	Display	Function	Setting
[F1]	REC A	CH-A Recording Current Adjustment	UNITY / VAR
[F2]	REC B	CH-B Recording Current Adjustment	UNITY / VAR
[F3]	REC C	CH-C Recording Current Adjustment	UNITY / VAR
[F4]	REC D	CH-D Recording Current Adjustment	UNITY / VAR
[F6]	REC TEST	REC TEST Menu	ON / OFF
[F8]	TRNSPT	ON / OFF of Servo System	ENABLE / DISABLE
[F10]	RESPONSE	Error Rate display mode selection	FAST / SLOW
[F11]	SAVE	RF Control Data Save	—
[F12]	EXIT	Returns to the RF ADJ menu.	

Table 3-5. Function of ADJUST-REC Menu

F1 : CH-A Recording Current Adjustment
F2 : CH-B Recording Current Adjustment
F3 : CH-C Recording Current Adjustment
F4 : CH-D Recording Current Adjustment

To adjust a specific channel : Select the channel desired by pressing F1 to F4.
Select VAR of UNITY / VAR. Make adjustment.
(Pressing F1 key to F4 key again, selects again the channel.)
For details, refer to Section 13. RF Signal System Adjustment.

F6 : REC TEST

When this key is pressed while F8 (TRNSPT) key is shown as DISABLE, the REC TEST mode is set and REC TEST display can be selected ON or OFF.

F8 : TRANSPORT

When pressing this key, indication is changed from ENABLE to DISABLE and Fig. 3-5 ADJUST REC Menu is displayed on the EL panel. And then, "READY FOR REC TEST" message is displayed.
When DISABLE is displayed, servo system is disabled and the VTR is ready to enter the REC TEST menu.
If this key is pressed while a cassette is threading, an "EJECT CASSETTE" message is displayed on the EL panel.

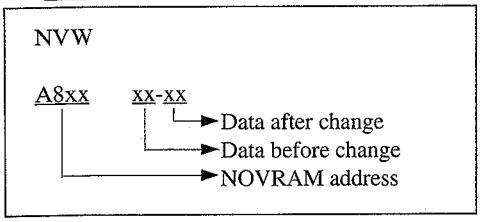
F10 : RESPONSE

This key is used for selecting a response speed for the CHANNEL CONDITION display (error rate indication of each channel).
Whenever this key is pressed, response speed setting is changed from "FAST" to "SLOW" or vice versa.

F11 : SAVE

When this key is pressed, the control data set in the menu is transferred to the nonvolatile memory (NOVRAM).
Data changed by the equalizer phase adjustment and the equalizer frequency response characteristic adjustment can not be transfer to NOVRAM as it is.
The new values are set for UNITY, so the data is transferred.
Data transfer is performed by the following procedure.

1. Press F11 (SAVE) key. The following message appears in the message area at the right side of the EL panel.



2. Push / key until the message "PUSH NVWR SW" appears in the message area. To cancel it during the operation, press SET key.
3. After the message "PUSH NVWR SW" appears in the message area, press the NVWR SW (S71) on SP-15 or SSP-07 board. Data transfer begins.
4. When the data has been transferred, "READY" appears in the message area.
5. Data has been transferred. When the unit is powered ON again, UNITY setting is changed.

3-3-5. REC TEST Menu

How to Enter and Exit the Menu

Press the keys on the control panel in the following sequence.

[TEST] : TEST menu is selected.
[F5] (RF) : RF menu is selected.
[F8] (RF ADJ) : RF ADJ menu is selected.
[F9] (REC ADJ) : REC ADJ menu is selected.
[F8] (TRNSPT) :
[F6] (REC TEST): The REC TEST menu is selected.

Explanation of Display

REC CURRENT : Recording current adjustment data of each channel is displayed in hexadecimal notation.
CHANNEL CONDITION : Error rate of each channel is displayed.
MESSAGE INDICATION : The message corresponding to the equipment state is displayed.

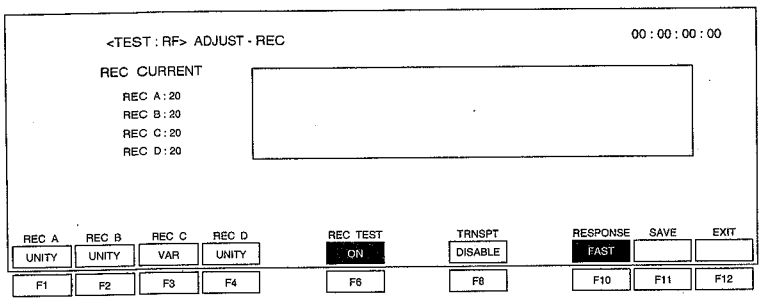


Fig. 3-6 REC TEST Menu Display

[F8] : TRANSPORT
When pressing this key, indication is changed from ENABLE to DISABLE and Fig. 3-6 REC TEST Menu is displayed on the EL panel. And then, "READY FOR REC TEST" message is displayed.
When DISABLE is displayed, servo system is disabled and the VTR is ready to enter the REC TEST menu.
If this key is pressed while a cassette is threading, an "EJECT CASSETTE" message is displayed on the EL panel.

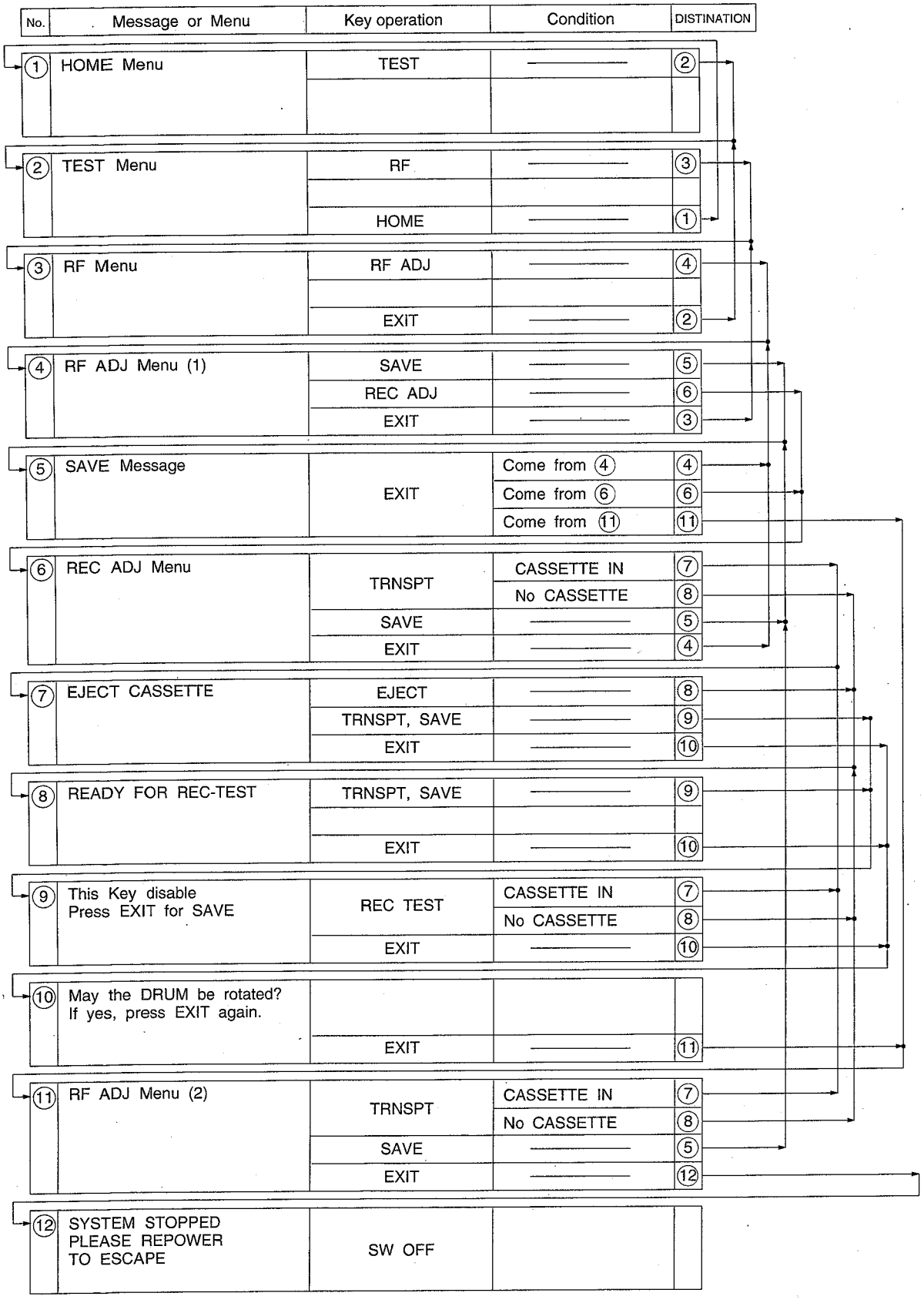
[F6] : REC TEST
When this key is pressed while [F8] (TRNSPT) key is shown as DISABLE, the REC TEST mode is set and REC TEST display can be selected ON or OFF.

[F12] : EXIT
This key is used to return to the RF ADJ menu.
After completing REC TEST, press this key. The following message is displayed.

> May the DRUM be rotated ?
> If yes, press EXIT?

Check that the DRUM is rotated. And then press the [F12] (EXIT) key again.

3-3-6. Message Flowchart



3-4. PROC MENU

This menu is used to check and adjust the video signal system and audio signal system of the equipment.

How to Enter and Exit the Menu

Press the keys on the control panel in the following sequence.

TEST : TEST menu is selected.
F7 (PROC) : PROC menu is selected.
(Fig. 3-5 PROC menu is displayed on the EL panel.)
F12 (EXIT) : The PROC menu is terminated and returns to TEST menu.

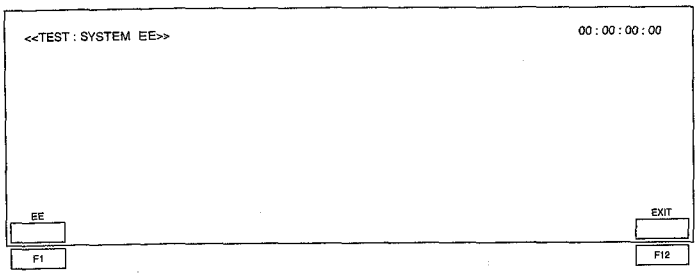


Fig. 3-7. PROC Menu Display

Press the F1 (EE) key toggles between ON and OFF.
ON : The (EE) ON setting is used to check the EE output signal (SYSTEM EE) of the video signal system and the audio signal system of the equipment. If other menu is entered, it is switched to OFF automatically.

OFF : Check normal signal.

3-5. MULTI-LOOP TEST

When A / D or D / A conversion is repeatedly performed during editing, video signals gradually deteriorate and distortion in creases. In order to minimize this distortion, a dummy loop circuit which is the same as the analog dubbing process can be created and the video signals passed through the circuit 5, 10, or 20 times, to adjust the set-up level, video level, chroma level and hue.

How to Enter and Exit the Menu

[TEST] : TEST menu is selected.
[F8] (MULTI) + [F] key : Multi-loop test is selected.
(Fig. 3-8 Multi-loop test is displayed on the EL panel.
[F12] (EXIT) : The Multi-loop test is terminated and returns to TEST menu.

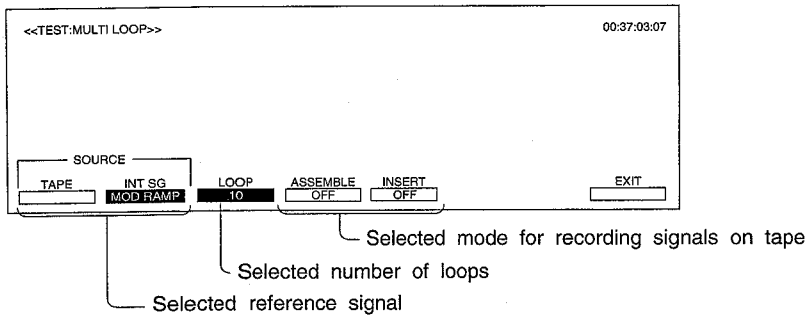
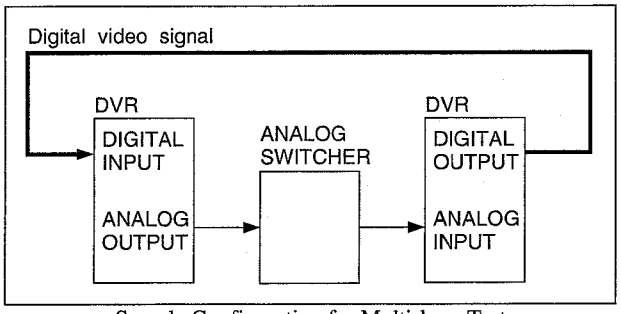


Fig. 3-8 Multi-loop Test Display

Four types of tests are available in Multi-loop test mode.

- When adjusting without recording on the tape using INT SG as the reference signal.
- When adjusting while recording on the tape using INT SG as the reference signal.
- When adjusting without recording on the tape using signals recorded on the tape.
- When adjusting while recording on the tape using signals recorded on the tape.

NOTE : To loop two units using the DVR-10/18/20/28,
Set S4-8 on the PR-157 board to ON.
V jitters on the monitor screen will be reduced.



Sample Configuration for Multi-loop Test

3-5-1. When adjusting without recording on the tape using INT SG as the reference signal

① Connect the ANALOG OUTPUT VIDEO connector output signal to the ANALOG VIDEO INPUT connector. When a switcher is included in this adjustment, the output signal should be passed through the switcher and then sent to the ANALOG VIDEO INPUT connector.

② Select TEST menu. Press the [F] key and [F8] key simultaneously to enter the TEST : MULTI LOOP menu.
After this menu is entered, the signal that is selected by F1 or F2 becomes the input signal regardless of the VIDEO : INPUT menu's F7 : VIDEO setting. This setting remains after the power is turned off.

③ Select a desired signal from F2 : INS SG.
Output signal can be altered by first selecting INT SG and çthen press the [F2] key.
(The signal source that is selected by this setting does not affect VIDEO IN.)
When the unit is shipped from factory, MODULATED RAMP is selected.

④ Select a desired number of repetition times of signal looping by pressing F3 : LOOP. The loop that is mentioned here consists of an electrical system having the same characteristics as that of analog dubbing. VIDEO OUT of the system is connected to VIDEO IN to configure an system where the signal is circulated at the rate of one generation per every field.

⑤ Start the MULTI LOOP TEST by pressing the EXECUTE button.
During execution of MULTI LOOP TEST, the five lamps of ENTRY IN, ENTRY OUT, EXECUTE, PREROLL, and SEARCH light on sequentially in clockwise direction. At the bottom left of screen, a bar graph showing the loop times is superimposed.

⑥ VIDEO OUTPUT menu is entered to execute the various adjustments.

⑦ The MULTI LOOP TEST is terminated by pressing a tape transport function button such as STOP, PLAY, etc.
It is terminated when a tape transport function command is given from REMOTE.

⑧ By selecting F4 : ASSEMBLE or F5 : INSERT and pressing the REC / EDIT button during execution of a MULTI LOOP TEST, tape can be recorded. (See Section 3-5-2.)

⑨ After completing the adjustment, the input signal to the ANALOG VIDEO INPUT connector should be reconnected to an ordinary signal.

3-5-2. When adjusting while recording on the tape using INT SG as the reference signal

① Connect the ANALOG OUTPUT VIDEO connector output signal to the ANALOG VIDEO INPUT connector. When a switcher is included in this adjustment, the output signal should be passed through the switcher and then sent to the ANALOG VIDEO INPUT connector.

② Select TEST menu. Press the [F] key and [F8] key simultaneously to enter the TEST : MULTI LOOP menu.
After this menu is entered, the signal that is selected by F1 or F2 becomes the input signal regardless of the VIDEO : INPUT menu's F7 : VIDEO setting. This setting remains after the power is turned off.

③ Select a desired signal from F2 : INT SG.
Output signal can be altered by first selecting INT SG and then press the [F2] key.
(The signal source that is selected by this setting does not affect VIDEO IN.)
When the unit is shipped from factory, MODULATED RAMP is selected.

④ Select a desired number of repetition times of signal looping by pressing F3:LOOP. The loop that is mentioned here consists of an electrical system having the same characteristics as that of analog dubbing. VIDEO OUT of the system is connected to VIDEO IN to configure an system where the signal is circulated at the rate of one generation per every field.

⑤ Select either the F4 : ASSEMBLE or F5 : INSERT mode. When CRASH REC is desired, this selection is not required.

⑥ Thread a tape.

⑦ By pressing simultaneously the REC / EDIT button (ASSEMBLE or INSERT), or REC / EDIT and PLAY (CRASH REC), MULTI LOOP TEST is initiated. When ASSEMBLE or INSERT mode is selected, a series of PREROLL, PLAY and REC operations are automatically executed so that the tape position where the REC / EDIT buttons are pressed becomes the record starting position.
During execution of MULTI LOOP TEST, the five lamps of ENTRY IN, ENTRY OUT, EXECUTE, PREROLL, and SEARCH light on sequentially in clockwise direction.
At the bottom left of screen, a bar graph showing the loop times is superimposed.

⑧ VIDEO OUTPUT menu is entered to execute the various adjustments.

⑨ The MULTI LOOP TEST is terminated by pressing a tape transport function button such as STOP, PLAY, etc.
It is terminated when a tape transport function command is given from REMOTE.

⑩ After completing the adjustment, the input signal to the ANALOG VIDEO INPUT connector should be reconnected to an ordinary signal.

3-5-3. When adjusting without recording on the tape using signals recorded on the tape

① Connect the ANALOG OUTPUT VIDEO connector output signal to the ANALOG VIDEO INPUT connector.
When a switcher is included in this adjustment, the output signal should be passed through the switcher and then sent to the ANALOG VIDEO INPUT connector.

② Install the prerecorded tape that has the recorded signal to be used as the reference signal.

③ Select TEST menu. Press the [F] key and [F8] key simultaneously to enter the TEST : MULTI LOOP menu.
After this menu is entered, the signal that is selected by F1 or F2 becomes the input signal regardless of the VIDEO : INPUT menu's F7 : VIDEO setting. This setting remains after the power is turned off.

④ Select TAPE by pressing the [F1] key.

⑤ Select a desired number of repetition times of signal looping by pressing F3 : LOOP. The loop that is mentioned here consists of an electrical system having the same characteristics as that of analog dubbing. VIDEO OUT of the system is connected to VIDEO IN to configure an system where the signal is circulated at the rate of one generation per every field.

⑥ Find picture of a desired signal with SHUTTLE, JOG, PLAY, etc.

⑦ Start the MULTI LOOP TEST by pressing the EXECUTE button.
The loop is configured with the signal recorded on tape that is threaded on equipment when EXECUTE button is pressed, as the first generation signal (being frozen).
During execution of MULTI LOOP TEST, the five lamps of ENTRY IN, ENTRY OUT, EXECUTE, PREROLL, and SEARCH light on sequentially in clockwise direction. At the bottom left of screen, a bar graph showing the loop times is superimposed.

⑧ VIDEO OUTPUT menu is entered to execute the various adjustments.

⑨ By pressing the REC / EDIT button during execution of a MULTI LOOP TEST, signal can be recorded on tape.
(See Section 3-5-4.)

⑩ The MULTI LOOP TEST is terminated by pressing a tape transport function button such as STOP, PLAY, etc.
It is terminated when a tape transport function command is given from REMOTE.

⑪ After completing the adjustment, the input signal to the ANALOG VIDEO INPUT connector should be reconnected to an ordinary signal.

3-5-4. When adjusting while recording on the tape using signals recorded on the tape

① Connect the ANALOG OUTPUT VIDEO connector output signal to the ANALOG VIDEO INPUT connector.
When a switcher is included in this adjustment, the output signal should be passed through the switcher and then sent to the ANALOG VIDEO INPUT connector.

② Install the prerecorded tape that has the recorded signal to be used as the reference signal.

③ Select TEST menu. Press the [F] key and [F8] key simultaneously to enter the TEST : MULTI LOOP menu.
After this menu is entered, the signal that is selected by F1 or F2 becomes the input signal regardless of the VIDEO : INPUT menu's F7 : VIDEO setting. This setting remains after the power is turned off.

④ Select TAPE by pressing the [F1] key.

⑤ Select a desired number of repetition times of signal looping by pressing F3 : LOOP. The loop that is mentioned here consists of an electrical system having the same characteristics as that of analog dubbing. VIDEO OUT of the system is connected to VIDEO IN to configure an system where the signal is circulated at the rate of one generation per every field.

⑥ Find picture of a desired signal with SHUTTLE, JOG, PLAY, etc.

⑦ Select either the F4 : ASSEMBLE or F5 : INSERT mode. When F1 : TAPE is selected, CRASH REC is inhibited.

⑧ By pressing the REC / EDIT button, MULTI LOOP TEST is initiated.
A series of PREROLL, PLAY and REC operations are automatically executed so that the tape position where the REC / EDIT buttons are pressed becomes the record starting position. During execution of MULTI LOOP TEST, the five lamps of ENTRY IN, ENTRY OUT, EXECUTE, PREROLL, and SEARCH light on sequentially in clockwise direction. At the bottom left of screen, a bar graph showing the loop times is superimposed.

⑨ VIDEO OUTPUT menu is entered to execute the various adjustments.

⑩ The MULTI LOOP TEST is terminated by pressing the STOP or EJECT button.
It is also terminated when the STOP or EJECT command is given from REMOTE.

⑪ After completing the adjustment, the input signal to the ANALOG VIDEO INPUT connector should be reconnected to an ordinary signal.

3-6. CHECKER MENU

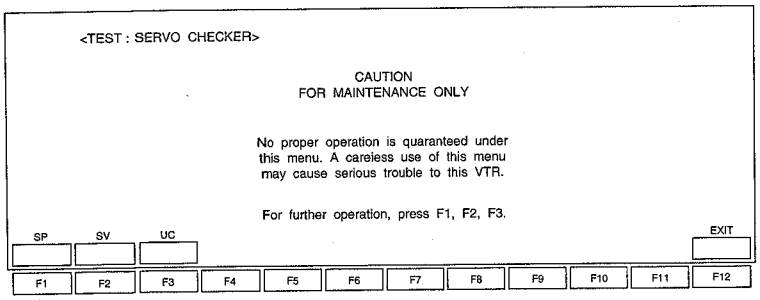
This menu is composed of three sections (SP, SV and UC). Test mode can be executed by inputting the desired command in each section.
(Refer to Section 3-6-7. Checker Menu Chart.)

This menu is used when adjusting servo system or tape transport system.

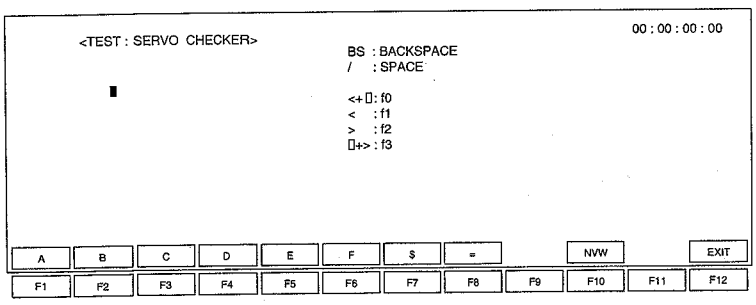
NOTE 1 : Be careful not to use the test mode not described in this manual. If the test mode is used, the corresponding operation cannot be guaranteed. To return to the normal state, turn the power on again.

NOTE 2 : Pay careful attention to the adjustments in this menu referring to Section 9, Tape Transport System Alignment and Section 10, Servo System Alignment. If several adjustments are incorrectly made in this menu, good-quality video and audio outputs may not be obtained or the tape or VTR mechanism system may be damaged.

The following operations are performed from control panel.
[TEST] : TEST menu is selected.
[F6] : CHECKER menu is selected.



When pressing [F1] (SP), [F2] (SV) or [F3] (UC) key, each CHECKER TEST menu is displayed on the EL panel and the cursor appears in the upper left position of the EL panel.



Select an appropriate command from "List of Commands" in Section 3-6-2.
When pressing [F12] (EXIT) key, returns to the TEST menu.

3-6-1. Keys' Description

Function Keys

Function key	F1	F2	F3	F4	F5	F6	F7	F8	F9	F10	F12
Display	A	B	C	D	E	F	S	=		NVW	EXIT

Cursor Key

In the servo system check, cursor keys are used as function keys.
The function is determined by the combination of three cursor keys, [>], [<] and [ ].
For explanations in this section, the cursor keys are referred to as f0~f3.

f0 = [ ] + [<] , f3 = [ ] + [>]
f1 = [<] , f2 = [>]

NOTE : For f0 and f3, press [ ] key and [<] key or [>] key at the same time.
However, when some of test commands are executed, each function is determined as the key is released.
Therefore release [<] key or [>] key before releasing [ ] key.

Other keys

[SET] : Used when you input a command or data.
[/] : Used as a space key. (Advance to the next address for $ and $$ commands.)
[BS] : Delete one character before the cursor. (Return to the previous address for $ and $$ commands.)
[GET] : Used when the data in the same address is read by $ and commands.

3-6-2. List of Commands

Session	Command	Function	Page
SP	$, $$	Rewrites memory data.	P. 3-35
	= 0	Resets the system.	P. 3-25
	NVW	Transfers the rewritten data to NOVRAM.	P. 3-26
	E	Enables the E test mode	P. 3-27 ~ 3-34
	F	Enables the F test mode	P. 3-35 ~ 3-64
SV	$, $$	Rewrites memory data.	P. 3-67
	= 0	Resets the system.	P. 3-68
	B	Enables the B test mode	P. 3-69 ~ 3-70
	C	Enables the C test mode	P. 3-71 ~ 3-88
	D	Enables the D test mode	P. 3-89 ~ 3-123
UC	$, $$	Rewrites memory data.	P. 3-126
	= 0	Resets the UC board.	P. 3-127
	B	Enables the B test mode	P. 3-128 ~ 3-131
	C	Enables the C test mode	P. 3-132 ~ 3-136
	D	Enables the D test mode	P. 3-137 ~ 3-139
	E	Enables the E test mode	P. 3-140 ~ 3-149
	F	Enables the F test mode	P. 3-150 ~ 3-155

3-6-3. Example of Command Usage

(1) When rewriting memory data : SP Session $ ($$) Command, SV Session $ ($$) Command, UC Session $ ($$) Command

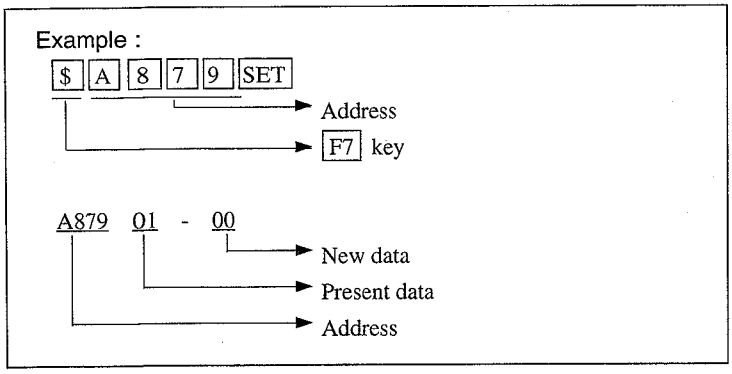
Press the keys on the control panel in the following sequence.

[TEST]	: TEST menu is selected.
[F6] (CHECKER)	: CHECKER Menu is selected.
[F1] (SP), [F2] (SV) or [F3] (UC)	: CHECKER Menu is selected.
[F12] (EXIT)	: CHECKER Menu is terminated and control returns to the TEST menu.

Rewriting data by byte

Enter data as one byte.

Data in Address A879 is changed to "00H". As the present data is displayed on the control panel, enter new data.



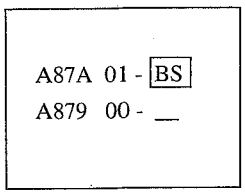
As soon as data input is completed, the cursor is moved to a position ready for the next byte of data.

How to Proceed to the Next Operation:

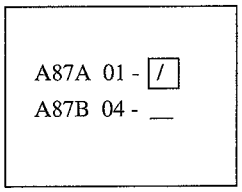
Return to the previous byte : Press the [BS] key.

Advance to the next byte : Press the [/] key.

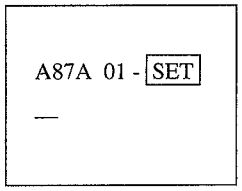
When data entry is completed: Press the [SET] key. (the status is waiting for command input)



<Move to the previous byte>



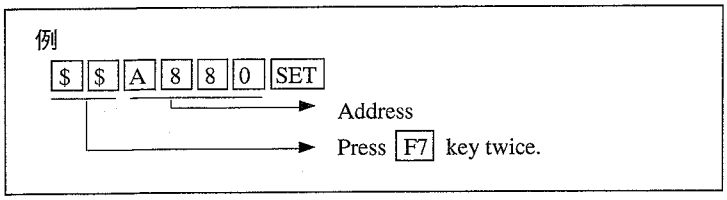
<Move to the next byte>



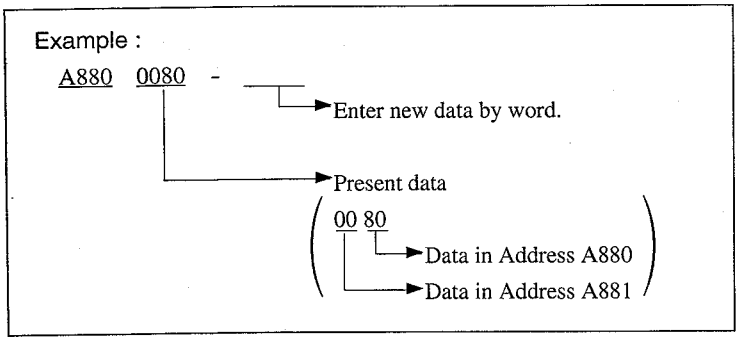
<Data entry is completed>

Rewriting data by word

To enter word data, select the mode from the command input state as follows:



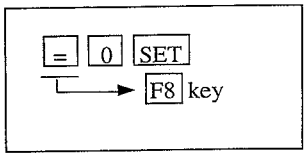
The control panel indication is :



The key operation is performed in the same way as for byte input.

(2) System Reset : SP Session = 0 Command, SV Session = 0 Command

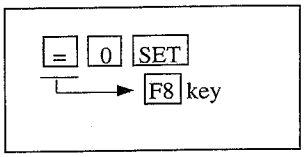
The system is reset to the same state as that when power is ON, or when the CPU RESET SW (S3) on SP-15 or SSP-07 board is pressed.
If this command is executed before the data is transferred to NOVRAM, the data changed by the $ or $$ command is lost.



The system is reset as follows.

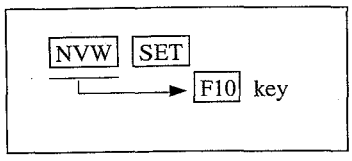
(3) UC Reset : UC Session = 0 Command

The UC board is reset to the same state as when power is turned on.
The system is reset as follows.



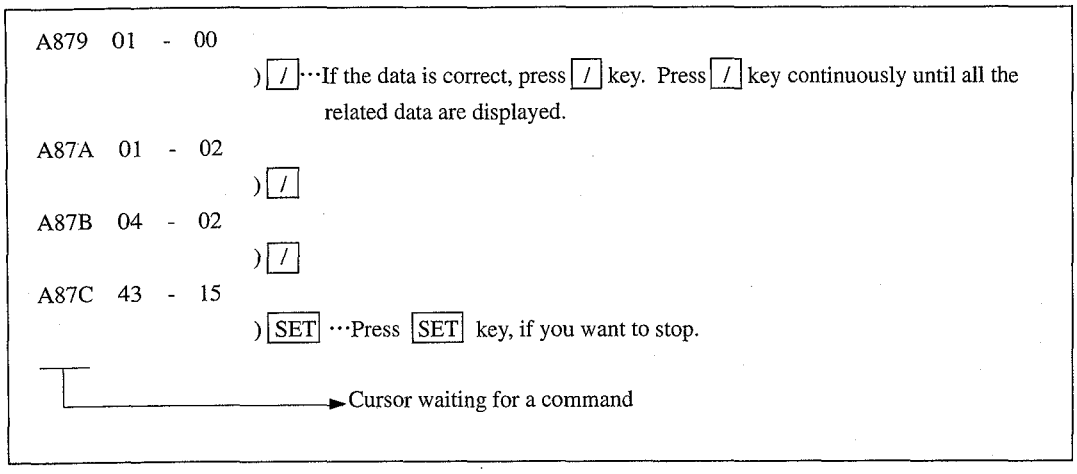
(4) Transfer of Rewritten Data to NOVRAM : SP Session NVW Command

The changed data is lost by $, $$ command and so on, when the system is reset or the power is turned on again. Execute this command to save the changed data.
However, if you rewrite data, the original data is lost. Therefore, do not change the data thoughtlessly.



NOTE : When "BASE SUM ERROR" is displayed at the first attempt, it indicates NOVRAM failure.
Confirmation of all data or replacement of NOVRAM is required.

The address whose data is changed where the previous and next data are displayed. If the address and the data are correct, press [/] key.
If you want to stop writing, press [SET] key.
If the data in any unrequired address is changed, stop writing.



After all the changed data values have been displayed, "PUSH NVWR SW" is displayed on the control panel. Then, push NVRW SW (S71) on SP-15 or SSP-07 board.
Data transfer is started. When data transfer is completed, "READY" is displayed, and NVW command is terminated.
When there is no changed data, "READY" is displayed and NVW command is terminated.

3-6-4. SP TEST MODE MENU

Command List

Command	Function
$, $$	MEMORY READ / WRITE
= 0	SP, SY, SV, DT RESET
NVW	NOVRAM WRITE
E20	TEST MODE OFF (Cancels E mode)
E21	REEL SHIFT SENSOR READ
E22	CASSETTE COMPERTMENT SENSOR READ
E23	CASSETTE COMPERTMENT SENSOR READ
E24	CASSETTE COMPERTMENT SENSOR READ
E25	THREAD SENSOR READ
E2A	DRUM DATA READ
E2C	CORDING HOLE SENSOR READ
E2D	CORDING HOLE SENSOR READ
F20	TEST MODE OFF (Cancels F mode)
F21	REEL SHIFT TEST
F22	CASSETTE COMPARTMENT ALL TEST
F23	INNER CASSETTE COMPARTMENT TEST
F24	OUTER CASSETTE COMPARTMENT TEST
F25	THREAD TEST
F26	MAIN PINCH TEST
F27	SUB PINCH TEST
F28	HEAD CLEANER TEST
F29	TAPE CLEANER TEST
F2A	DRUM TEST
F30	TEST MODE OFF (Cancels F mode)
F31	REEL SHIFT TEST
F32	CASSETTE COMPARTMENT ALL DRIVER TEST
F33	INNER CASSETTE COMPARTMENT DRIVER TEST
F34	OUTER CASSETTE COMPARTMENT DRIVER TEST
F35	THREAD DRIVER TEST
F36	MAIN PINCH DRIVER TEST
F37	SUB PINCH DRIVER TEST
F38	HEAD CLEANER DRIVER TEST
F39	TAPE CLEANER DRIVER TEST
F3A	DRUM DRIVER TEST

SP $, $$ MEMORY READ / WRITE

Outline

This command can read or write the data of the memory specified by SP CPU in bytes or words.
Since the memory value is important to the determination of the VCR operation, confirm the contents of it completely before reading or writing the memory.
$ is used to read or write data in bytes, and $$ to read or write it in words.

Operation

Enter the address of $ or $$ memory. The memory address and the current data are displayed as shown below.

A800 20-

To rewrite data, enter a new data item you wish to enter.
The data is changed, and the address is advanced automatically. The display below then appears.

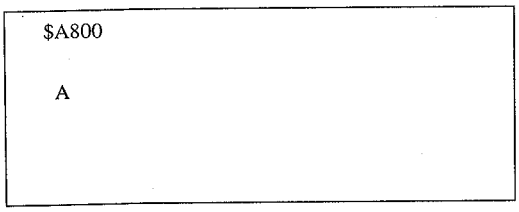
A800 20-21
A811 20-

To rewrite data in succession, repeat the same key operation as the above.

Other key operations

To return to the preceding byte by one, press the [BS] key.
To proceed to the following byte by one, press the [/] key.
To terminate the operation, press the [SET] key.

Control Panel Display



A : A800 20-21
- 21 → Newly entered data
- 20 → Present data
- A800 → Address

SP = 0 SP, SY, SV, DT RESET

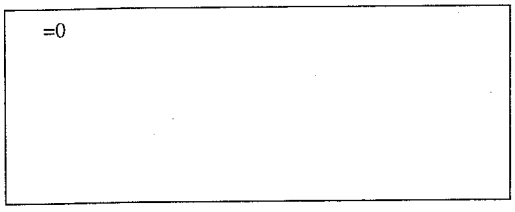
Outline

Entering this command can reset the SP, SV, SY and DT boards.

Operation

Enter the = 0 command using the function keys and numeric keypad on the control panel.

Control Panel Display



SP NVW NOVRAM WRITE

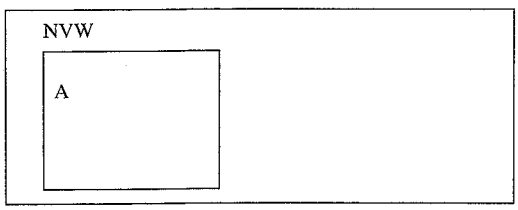
Outline

This command can perform the NOVRAM WRITE operation that writes the data rewritten by memory write or adjustment in NOVRAM.
The adjustment value and set value that are important to the VCR operation are written in the NOVRAM.
The former data is lost when it is rewritten. Pay careful attention when rewriting data.

NOVRAM WRITE Operation

① Enter the SP NVW command. The address whose data was changed, the data before change, and the data after change are displayed.
② Press the [/] key if no error exists in the address and data.
The changed data is displayed sequentially. To stop the write when an error exists, press the [SET] key.
③ After all the changed data items are displayed (addresses A8FE through A8FF are a checksum), message "PUSH NVWR SW" is displayed çon the control panel.
Press the S71 (NVW) switch on the SP-15 or SSP-07 board.
④ Data transfer is initiated.
⑤ After the data transfer is completed, message "READY" is displayed. The NVW command is completed.

Control Panel Display



A : A800 20-21
- A800 → Address
- 20 → Data before change
- 21 → Data after change

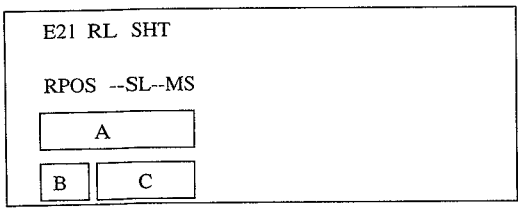
The messages below are displayed.
"PUSH NVWR SW" : The display of all the changed data items is completed. Press the S71 (NVWR) switch to transfer data.
"READY" : Data transfer is completed.

SP E21 : REEL SHIFT SENSOR READ

Outline

The reel shift sensor state can be displayed in this test mode.
The VTR operates ordinarily during test mode operation.
To erase the display of the reel shift sensor state, cancel the test mode by entering the E20 test mode or turning off the power.
This test mode is canceled when the next test mode is entered.

Control Panel Display



A : No display appears.

B : DVR-28 reel shift position data

```
--XX
  └─ DVR-28 REEL SHIFT POSITION DATA
     (L-CASSETTE POSITION DATA > S-CASSETTE POSITION DATA)
```

Specifications

1. 6Fh ± 01h = A and value A - 30h = NOVRAM $A8AD when the reel shifts from L-cassette position to M-cassette position and when the take-up reel spring contracts.
2. Value A ± 03h = B and value B + 30 h = NOVRAM $A8AE when the reel shifts from S-cassette position to M-cassette position and when the supply reel spring contracts.
3. The value when the reel shifts to the S-cassette position and when the take-up reel spring contracts is NOVRAM $A8AC.
4. The value when the reel shifts to the L-cassette position and when the supply reel spring contracts is NOVRAM $A8AF.

C : Reel shift sensor state

DVR-20

```
------XXB
      ├─→ 1 : NO  0 : REEL SHIFT S-POSITION
      └─→ 1 : NO  0 : REEL SHIFT M-POSITION
```

DVR-28

```
--XX----B
  ├──→ 1 : NO  0 : L-DIRECTION SPRING (S-REEL) SHORT
  └──→ 1 : NO  0 : S-DIRECTION SPRING (T-REEL) SHORT
```

Specifications

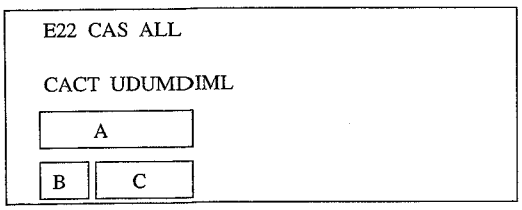
DVR-28
The sensor data must change from "1" to "0" in the position where each spring contracts by 1 mm.

SP E22 : CASSETTE COMPARTMENT SENSOR READ

Outline

The cassette compartment sensor state can be displayed in this test mode.
The VTR operates ordinarily during test mode operation.
To erase the display of the cassette compartment sensor state, cancel the test mode by entering the E20 test mode or turning off the power.
This test mode is canceled when the next test mode is entered.

Control panel display



A : No display appears.

B : Cassette compartment control data

DVR-20

--XX

→ CASSETTE COMPARTMENT CONTROL DATA

DVR-28

XXXX

→ INNER CASSETTE COMPARTMENT CONTROL DATA
→ OUTER CASSETTE COMPARTMENT CONTROL DATA

C : Sensor state of the cassette compartment

DVR-20

XX---XX-B

→ 1 : M-SIZE CASSETTE DETECT 0 : NO
→ 1 : NO 0 : CASSETTE IN
→ 1 : NO 0 : COMPARTMENT DOWN
→ 1 : NO 0 : COMPARTMENT UP

DVR-28

XXXXXXXXB

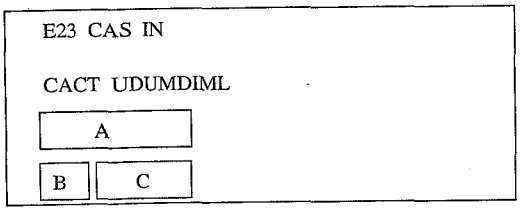
→ 1 : L-SIZE CASSETTE DETECT 0 : NO
→ 1 : L,M-SIZE CASSETTE DETECT 0 : NO
→ 1 : NO 0 : CASSETTE IN DETECT
→ 1 : NO 0 : OUTER COMPARTMENT DOWN
→ 1 : NO 0 : OUTER COMPARTMENT MID~DOWN
→ 1 : NO 0 : OUTER COMPARTMENT UP
→ 1 : NO 0 : INNER COMPARTMENT DOWN
→ 1 : NO 0 : INNER COMPARTMENT UP

SP E23 : CASSETTE COMPARTMENT SENSOR READ

Outline

The cassette compartment sensor state can be displayed in this test mode.
The VTR operates ordinarily during test mode operation.
To erase the display of the cassette compartment sensor state, cancel the test mode by entering the E20 test mode or turning off the power.
This test mode is canceled when the next test mode is entered.

Control Panel Display



A : No display appears.

B : Cassette compartment control data

DVR-20

--XX

→ CASSETTE COMPARTMENT CONTROL DATA

DVR-28

XXXX

→ INNER CASSETTE COMPARTMENT CONTROL DATA
→ OUTER CASSETTE COMPARTMENT CONTROL DATA

C : Sensor state of the cassette compartment

DVR-20

XX---XX-B

→ 1 : M-SIZE CASSETTE DETECT 0 : NO
→ 1 : NO 0 : CASSETTE IN
→ 1 : NO 0 : COMPARTMENT DOWN
→ 1 : NO 0 : COMPARTMENT UP

DVR-28

XXXXXXXXB

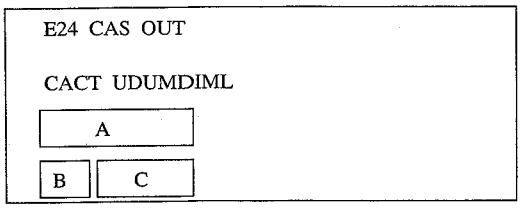
→ 1 : L-SIZE CASSETTE DETECT 0 : NO
→ 1 : L,M-SIZE CASSETTE DETECT 0 : NO
→ 1 : NO 0 : CASSETTE IN DETECT
→ 1 : NO 0 : OUTER COMPARTMENT DOWN
→ 1 : NO 0 : OUTER COMPARTMENT MID~DOWN
→ 1 : NO 0 : OUTER COMPARTMENT UP
→ 1 : NO 0 : INNER COMPARTMENT DOWN
→ 1 : NO 0 : INNER COMPARTMENT UP

SP E24 : CASSETTE COMPARTMENT SENSOR READ

Outline

The cassette compartment sensor state can be displayed in this test mode.
The VTR operates ordinarily during test mode operation.
To erase the display of the cassette compartment sensor state, cancel the test mode by entering the E20 test mode or turning off the power.
This test mode is canceled when the next test mode is entered.

Control Panel Display



A : No display appears.

B : Cassette compartment control data

DVR-20

- - XX
  - → CASSETTE COMPARTMENT CONTROL DATA

DVR-28

XXXX
- → INNER CASSETTE COMPARTMENT CONTROL DATA
- → OUTER CASSETTE COMPARTMENT CONTROL DATA

C : Sensor state of the cassette compartment

DVR-20

XX - - - XX - B
- → 1 : M-SIZE CASSETTE DETECT 0 : NO
- → 1 : NO 0 : CASSETTE IN
- → 1 : NO 0 : COMPARTMENT DOWN
- → 1 : NO 0 : COMPARTMENT UP

DVR-28

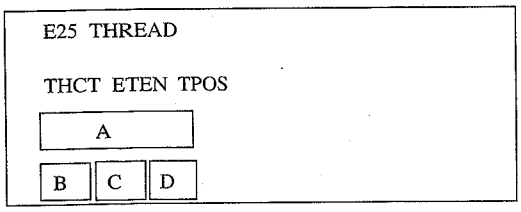
XXXXXXXXB
- → 1 : L-SIZE CASSETTE DETECT 0 : NO
- → 1 : L,M-SIZE CASSETTE DETECT 0 : NO
- → 1 : NO 0 : CASSETTE IN DETECT
- → 1 : NO 0 : OUTER COMPARTMENT DOWN
- → 1 : NO 0 : OUTER COMPARTMENT MID~DOWN
- → 1 : NO 0 : OUTER COMPARTMENT UP
- → 1 : NO 0 : INNER COMPARTMENT DOWN
- → 1 : NO 0 : INNER COMPARTMENT UP

SP E25 : THREAD SENSOR READ

Outline

The threading sensor state can be displayed in this test mode.
The VTR operates ordinarily during test mode operation.
To erase the display of the threading sensor state, cancel the test mode by entering the E20 test mode or turning off the power.
This test mode is canceled when the next test mode is entered.

Control Panel Display



A : No display appears.

B : Threading arm control data

--XX
└→THREADING ARM CONTROL DATA

C : Tension control reference data during threading

--XX
└→TENSION REFERENCE DATA (1g=16 / 25h)

D : Threading arm position data

--XX
└→THREADING POSITION DATA

Specifications

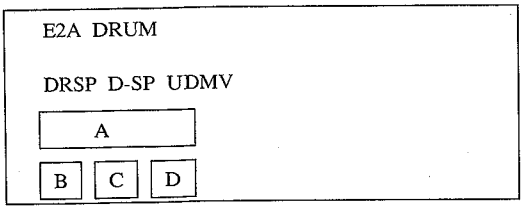
0EDh in the threading standard position is written into the DATA = $A8A1 in the unthreading standard position.

SP E2A DRUM DATA READ

Outline

The drum state can be displayed in this test mode.
The VTR operates ordinarily during test mode operation.
To erase the display of the coding hole sensor state, cancel the test mode by entering the E20 test mode or turning off the power.
This test mode is canceled when the next test mode is entered.

Control Panel Display



A : No display appears.

B : Drum speed is displayed.
NTSC : 30h = 48 normal speed
PAL : 40h = 64 normal speed

C : Drum speed is displayed.
2710h = 10000 normal speed

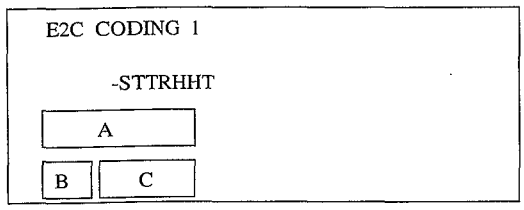
D : Control data of drum is displayed.

SP E2C : CODING HOLE SENSOR READ

Outline

The coding hole sensor state can be displayed in this test mode.
The VTR operates ordinarily during test mode operation.
To erase the display of the coding hole sensor state, cancel the test mode by entering the E20 test mode or turning off the power.
This test mode is canceled when the next test mode is entered.

Control Panel Display



A : No display appears.

B : No display appears.

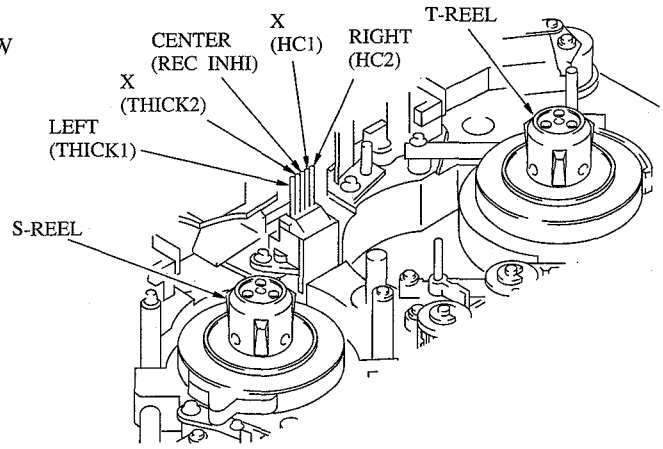
C: The detected data of cassete coding hole sensor is displayed.

-XXXXXXXB

- 1 : T-REEL SIDE USER FREE 0 : PUSH
- 1 : CODING HOLE THICK1 FREE 0 : PUSH
- 1 : CODING HOLE THICK2 FREE 0 : PUSH
- 1 : RECORD INHIBIT SW FREE 0 : PUSH
- 1 : CODING HOLE HC1 FREE 0 : PUSH
- 1.: CODING HOLE HC2 FREE 0 : PUSH
- 1 : S-REEL SIDE USER FREE 0 : PUSH

NOTE :

SWITCH POSITION VIEW

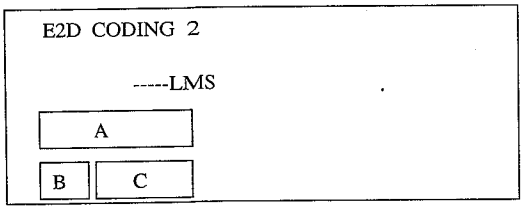


SP E2D : CODING HOLE SENSOR READ

Outline

The coding hole sensor state can be displayed in this test mode.
The VTR operates ordinarily during test mode operation.
To erase the display of the coding hole sensor state, cancel the test mode by entering the E20 test mode or turning off the power.
This test mode is canceled when the next test mode is entered.

Control Panel Display



A : No display appears.

B : No display appears.

C : The detected data of cassette coding hole sensor is displayed.

-----XXXB
- 1 : S-CASSETTE CENTER USER FREE 0 : PUSH
- 1 : M-CASSETTE CENTER USER FREE 0 : PUSH
- 1 : L-CASSETTE CENTER USER FREE 0 : PUSH (DVR-28 only)

SP F21 : REEL SHIFT TEST

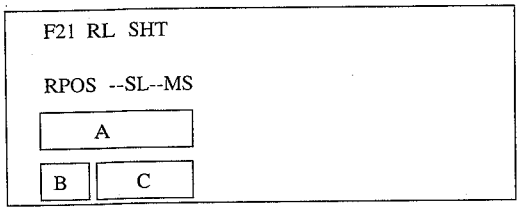
Outline

The reel shift test operation can be performed in this test mode.
The reel is shifted to the specified position by the function key operation.
The operation in this test mode uses sensor information, turns on or off a motor, and performs power control, as in the ordinary operation.
This test mode must be performed when the VTR is in the EJECT mode and when the cassette compartment is in the up position.
The VTR does not operate ordinarily during test mode operation.
During operation completion, cancel the test mode by entering the F20 test mode or turning off the power.
This test mode is canceled when the next test mode is entered.

Key Operation

(DVR-20)		(DVR-28)
[<]+[ ]	(f0) : Shifts to the M-cassette position.	Shifts to the L-cassette position.
[<]	(f1) : Shifts to the M-cassette position.	Shifts to the M-cassette position.
[>]	(f2) : Shifts to the M-cassette position.	Shifts to the M-cassette position.
[>]+[ ]	(f3) : Shifts to the S-cassette position.	Shifts to the S-cassette position.

Control Panel Display



A : The error messages below are displayed when a problem.
"NOT CAS UP": The cassette compartment is not in the up position.

"NOT EJECT" : The VTR is not in the EJECT mode.

For countermeasures, refer to Section 3-6-8. Countermeasures for Error Messages.

B : DVR-28 reel shift position data

--XX
DVR-28 REEL SHIFT POSITION DATA
(L-CASSETTE POSITION DATA > S-CASSETTE POSITION DATA)

Specifications

1. 6Fh ± 01h = A and value A - 30h = NOVRAM $A8AD when the reel shifts from L-cassette position to M-cassette position and when the take-up reel spring contracts.
2. Value A ± 03h = B and value B + 30h = NOVRAM $A8AE when the reel shifts from S-cassette position to M-cassette position and when the supply reel spring contracts.
3. The value when the reel shifts to the S-cassette position and the take-up reel spring contracts is NOVRAM $A8AC.
4. The value when the reel shifts to the L-cassette position and the supply reel spring contracts is NOVRAM $A8AF.

C : Reel shift sensor state

DVR-20

------XXB

1 : NO 0 : REEL SHIFT S-POSITION

1 : NO 0 : REEL SHIFT M-POSITION

DVR-28

--XX----B

1 : NO 0 : L-DIRECTION SPRING (S-REEL) SHORT

1 : NO 0 : S-DIRECTION SPRING (T-REEL) SHORT

Specifications

DVR-28

The sensor data must change from "1" to "0" in the position where each spring contracts by 1 mm.

SP F22 : CASSETTE COMPARTMENT ALL TEST

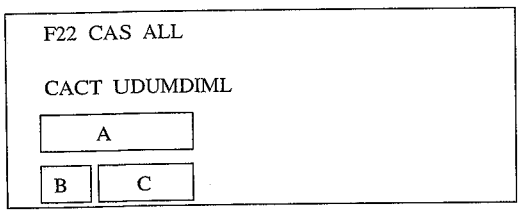
Outline

The cassette compartment test operation can be performed in this test mode.
The cassette compartment is shifted to the specified position by the function key operation.
The operation in this test mode uses sensor information, turns on or off a motor, and performs power control, as in ordinary operation
This test mode must be performed when the VTR is in the EJECT mode, when the threading arm is in the unthreading position, and when the cassette is not in the compartment position.
When using a cassette, enter the test mode after confirming that the cassette is inserted properly and that the reel table is in the proper position.
The VTR does not operate ordinarily during test mode operation.
During operation completion, cancel the test mode by entering the F20 test mode or turning off the power.
This test mode is canceled when the next test mode is entered.

Key Operation

[<]+[ ] (f0) : Continuously performs the cassette compartment-down operation.
[<] (f1) : Can perform the cassette compartment-down operation only when this key is pressed.
[>] (f2) : Can perform the cassette compartment-up operation only when this key is pressed.
[>]+[ ] (f3) : Continuously performs the cassette compartment-up operation.

Control Panel Display



A : The error messages are displayed when a problem.
"C SIZE NG" : A cassette size detection error occurs.

"NOT EJECT" : The VTR is not in the EJECT mode.

"NOT R POS S", "NOT R POS M", "NOT R POS L" :
The reel position does not coincide with the cassette size.

"NOT UNTHR": The threading arm is not in the unthreading position.

For countermeasures, refer to Section 3-6-8. Countermeasures for Error Messages.

B : Cassette compartment control data

DVR-20
--XX
└→ CASSETTE COMPARTMENT CONTROL DATA

DVR-28
XXXX
└→ INNER CASSETTE COMPARTMENT CONTROL DATA
└→ OUTER CASSETTE COMPARTMENT CONTROL DATA

C : Sensor state of the cassette compartment

DVR-20

XX - - - XX - B

- 1 : M-SIZE CASSETTE DETECT 0 : NO
- 1 : NO 0 : CASSETTE IN
- 1 : NO 0 : COMPARTMENT DOWN
- 1 : NO 0 : COMPARTMENT UP

DVR-28

XXXXXXXXB

- 1 : L-SIZE CASSETTE DETECT 0 : NO
- 1 : L,M-SIZE CASSETTE DETECT 0 : NO
- 1 : NO 0 : CASSETTE IN DETECT
- 1 : NO 0 : OUTER COMPARTMENT DOWN
- 1 : NO 0 : OUTER COMPARTMENT MID-DOWN
- 1 : NO 0 : OUTER COMPARTMENT UP
- 1 : NO 0 : INNER COMPARTMENT DOWN
- 1 : NO 0 : INNER COMPARTMENT UP

SP F23 : INNER CASSETTE COMPARTMENT TEST

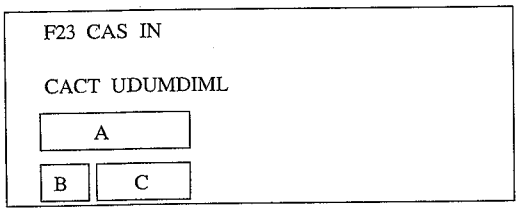
Outline

This test mode becomes the same in operation as the F22 test mode when it is selected in the DVR-20.
The VTR does not operate ordinarily during test mode operation.
During operation completion, cançel the test mode by entering the F20 test mode or turning off the power.
This test mode is canceled when the next test mode is entered.
The inner cassette compartment test operation can be performed in the DVR-28.
The inner cassette compartment is shifted to the specified position by the function key operation.
The operation in this test mode uses sensor information, turns on or off a motor, and performs power control, as in the ordinary operation.
This test mode must be performed when the VTR is in the EJECT mode and when the outer cassette compartment is in the up position.

Key Operation

[<]+[ ] (f0) : Continuously performs the inner cassette compartment-down operation.
[<] (f1) : Can perform the inner cassette compartment-down operation only when this key is pressed.
[>] (f2) : Can perform the inner cassette compartment-up operation only when this key is pressed.
[>]+[ ] (f3) : Continuously perform the inner cassette compartment-up operation.

Control Panel Display



A : The error messages below are displayed when a problem.
"NOT EJECT" : The VTR is not in the EJECT mode.

"NOT OUT UP" : The outer compartment is not in the up position.

For countermeasures, refer to Section 3-6-8. Countermeasures for Error Messages.

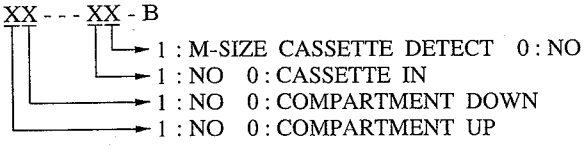
B : Cassette compartment control data

DVR-20
- - XX
└→ CASSETTE COMPARTMENT CONTROL DATA

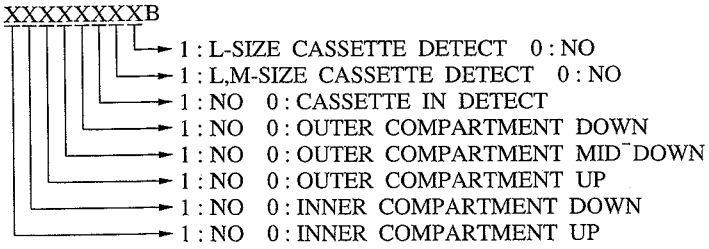
DVR-28
XXXX
└→ INNER CASSETTE COMPARTMENT CONTROL DATA
└→ OUTER CASSETTE COMPARTMENT CONTROL DATA

C : Sensor state of the cassette compartment

DVR-20



DVR-28



SP F24 : OUTER CASSETTE COMPARTMENT TEST

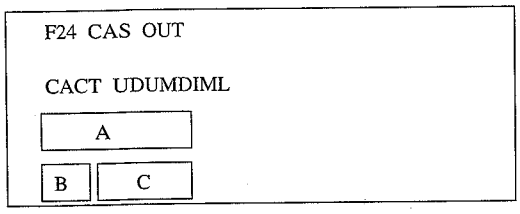
Outline

This test mode becomes the same in operation as the F22 test mode when it is selected in the DVR-20.
The VTR does not operate ordinarily during test mode operation.
During operation completion, cancel the test mode by entering the F20 test mode or turning off the power.
This test mode is canceled when the next test mode is entered.
The outer cassette compartment test operation can be performed with the DVR-28.
The outer cassette compartment is shifted to the specified position by the function key operation.
The operation in this test mode uses sensor information, turns on or off a motor, and performs power control, as in the ordinary operation.
This test mode must be performed when the VTR is in the EJECT mode, when the threading arm is in the unthreading position, and when the cassette is not in the compartment position.
When using a cassette, enter the test mode after confirming that the cassette is inserted properly and that the reel table is in the proper position.

Key Operation

[<]+[ ] (f0) : Continuously performs the outer cassette compartment-down operation.
[<] (f1) : Can perform the outer cassette compartment-down operation only when this key is pressed.
[>] (f2) : Can perform the outer cassette compartment-up operation only when this key is pressed.
[>]+[ ] (f3) : Continuously performs the outer cassette compartment-up operation.

Control Panel Display



A : The error messages below are displayed when a problem.

"C SIZE NG" : A cassette size detection error occurs.

"NOT EJECT" : The VTR is not in the EJECT mode.

"NOT IN DWN": The inner compartment is not in the down position.

"NOT R POS S", "NOT R POS M", "NOT R POS L" :
The reel position does not coincide with the cassette size.

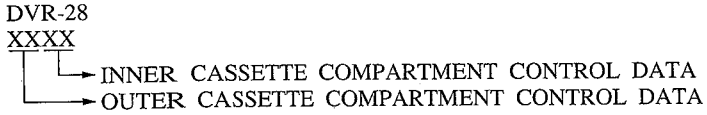
"NOT UNTHR" : The threading arm is not in the unthreading position.

For countermeasures, refer to Section 3-6-8. Countermeasures for Error Messages.

B : Cassette compartment control data

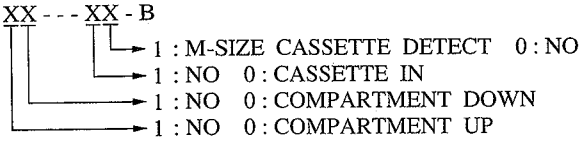
DVR-20

DVR-28

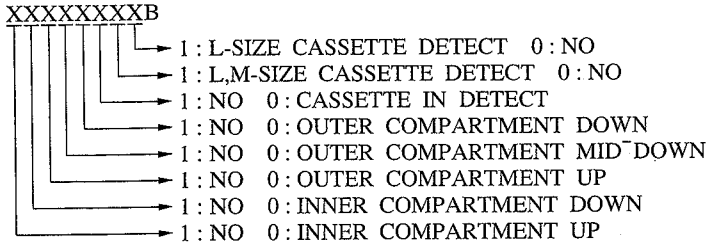


C : Sensor state of the cassette compartment

DVR-20



DVR-28



SP F25 : THREAD TEST

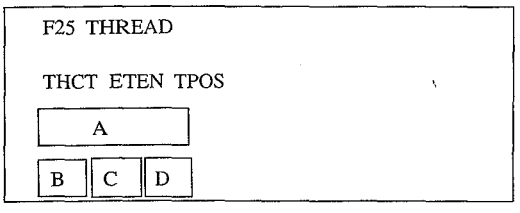
Outline

The threading test operation can be performed in this test mode.
The threading arm is shifted to the specified position by the function key operation.
The operation in this test mode uses sensor information, turns on or off a motor, and performs power control, as in the ordinary operation.
This test mode must be performed when the VTR is in the EJECT mode, when the cassette compartment is in the up position, and when the pinch roller is off.
The VTR does not operate ordinarily during test mode operation.
During operation completion, set the test mode to off by entering the F20 test mode or turning off the power.
This test mode is set to off when the next test mode is entered.

Key Operation

[<]+[ ] (f0) : Shifts to the threading position.
[<] (f1) : Shifts to the threading position only when this key is pressed.
[>] (f2) : Shifts to the unthreading position only when this key is pressed.
[>]+[ ] (f3) : Shifts to the unthreading position.

Control Panel Display



A : The error messages below are displayed when a problem.
"NOT CAS UP" : The cassette compartment is not in the up position.

"NOT EJECT" : The VTR is not in the EJECT mode.

"NOT PIN OFF": The pinch roller is not off.

For countermeasures, refer to Section 3-6-8. Countermeasures for Error Messages.

B : Threading arm control data

--XX
└→ THREADING ARM CONTROL DATA

C : Tension control reference data during threading

--XX
└→ TENSION REFERENCE DATA (1g=16 / 25h)

D : Threading arm position data

- - XX
  └→ THREADING POSITION DATA

Specifications

0EDh in the threading standard position is written into the DATA = $A8A1 in the unthreading standard position.

SP F26 : MAIN PINCH TEST

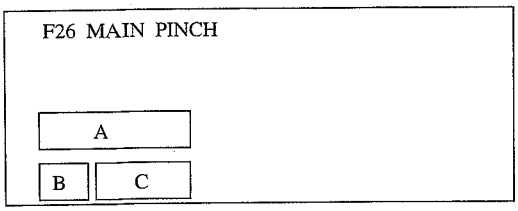
Outline

The main pinch test operation can be performed in this test mode.
The specified main pinch roller is turned on or off by the function key operation.
The operation in this test mode performs the same control as for the ordinary operation.
This test mode must be performed when the VTR is in the EJECT mode and when the threading arm is in the threading or unthreading position.
The VTR does not operate ordinarily during test mode operation.
During operation completion, set the test mode to off by entering the F20 test mode or turning off the power.
This test mode is set to off when the next test mode is entered.

Key Operation

[<] (f1) : Turns off the main pinch roller only when this key is pressed.
[>] (f2) : Turns on the main pinch roller.
[>]+[ ] (f3) : Turns on the main pinch roller.

Control Panel Display



A : The error messages below are displayed when a problem.
"NOT EJECT" : The VTR is not in the EJECT mode.

"THR POS NG" : The threading arm is not in the threading or unthreading position.

For countermeasures, refer to Section 3-6-8. Countermeasures for Error Messages.

B, C : Numbers are displayed, but they have no meaning.

SP F27 : SUB PINCH TEST

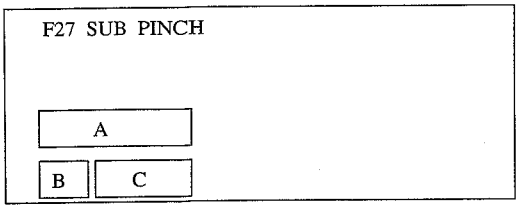
Outline

The sub pinch test operation can be performed in this test mode.
The specified sub pinch roller is turned on or off by the function key operation.
The operation in this test mode performs the same control as for the ordinary operation.
This test mode must be performed when the VTR is in the EJECT mode and when the threading arm is in the threading or unthreading position.
When the sub pinch roller is set to on state from off state, push it with your finger.
The VTR does not operate ordinarily during test mode operation.
During operation completion, set the test mode to off by entering the F20 test mode or turning off the power.
This test mode is canceled when the next test mode is entered.

Key Operation

[<] (f1) : Turns off the sub pinch roller.
[>] (f2) : Turns on the sub pinch roller only when this key is pressed.
[>] + [ ] (f3) : Turns on the sub pinch roller.

Control Panel Display



A : The error messages below are displayed when a problem.
"NOT EJECT" : The VTR is not in the EJECT mode.

"THR POS NG" : The threading arm is not in the threading or unthreading position.

For countermeasures, refer to Section 3-6-8. Countermeasures for Error Messages.

B, C : Numbers are displayed, but they have no meaning.

SP F28 : HEAD CLEANER TEST

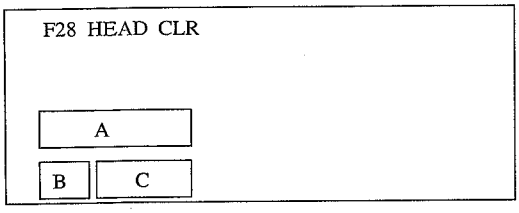
Outline

The head cleaner test operation can be performed in this test mode.
The head cleaner is turned on or off by the function key operation.
The operation in this test mode performs the same control as for the ordinary operation.
The VTR does not operate ordinarily during test mode operation.
During operation completion, cancel the test mode by entering the F20 test mode or turning off the power.
This test mode is set to off when the next test mode is entered.

Key Operation

[<] + [ ] (f0) : Turns on or off the head cleaner.
[<] (f1) : Turns on or off the head cleaner only when this key is pressed.
[>] (f2) : Turns off the head cleaner.

Control Panel Display



A, B, C : Numbers are displayed, but they are no meaning.

SP F29 : TAPE CLEANER TEST

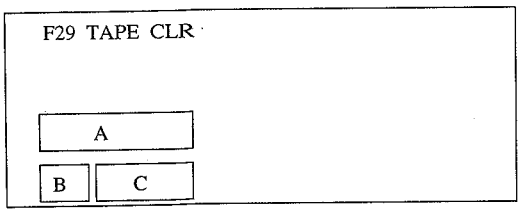
Outline

The tape cleaner test operation can be performed in this test mode.
The tape cleaner is turned on or off by the function key operation.
The operation in this test mode performs the same control as for the ordinary operation.
This test mode must be performed when the VTR is in the EJECT mode.
The VTR does not operate ordinarily during test mode operation.
During operation completion, cancel the test mode by entering the F20 test mode or turning off the power.
This test mode is canceled when the next test mode is entered.

Key Operation

[<] + [ ] (f0) : Turns on the tape cleaner.
[<] (f1) : Turns on the tape cleaner only when this key is pressed.
[>] (f2) : Turns off the tape cleaner.

Control Panel Display



A : The error message below is displayed when a problem.
"NOT EJECT" : The VTR is not in the EJECT mode.

For countermeasures, refer to Section 3-6-8. Countermeasures for Error Messages.

B, C : Numbers are displayed, but they have no meaning.

SP F2A : DRUM TEST

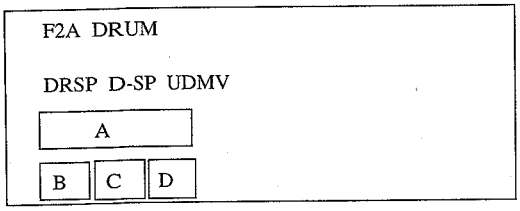
Outline

The drum rotation test operation can be performed in this test mode.
The drum is rotated by the function key operation.
This test mode must be performed when the VTR is in the EJECT mode.
The VTR does not operate ordinarily during test mode operation.
During operation completion, cancel the test mode by entering the F20 test mode or turning off the power.
This test mode is canceled when the next test mode is entered.

Key Operation

[<] (f1) : Stops the drum rotation.
[>] (f2) : Rotates the drum at low speed.
[>] + [ ] (f3) : Rotates the drum at high speed.

Control Panel Display



A : The error message below is displayed when a problem.
"NOT EJECT" : The VTR is not in the EJECT mode.

For countermeasures, refer to Section 3-6-8. Countermeasures for Error Messages.

B : Drum speed is displayed.
NTSC : 30h = 48 normal speed
PAL : 40h = 64 normal speed

C : No display appears.

D : Control data of drum is displayed.

SP F31 : REEL SHIFT DRIVER TEST

Outline

The reel shift driver test operation can be performed in this test mode.
The reel is shifted in the specified direction by the function key operation, and the reel stopper pin moves up and down in the DVR-28.
Unlike the ordinary operation, the operation in this test mode uses no sensor information.
Therefore, the motor is not stopped automatically, and the variable power is not controlled.
Be careful not to damage the mechanical system and tape during test mode operation.
The VTR does not operate ordinarily during test mode operation.
During operation completion, set the test mode to off by entering the F30 test mode or turning off the power.
This test mode is set to off when the next test mode is entered.

Key Operation

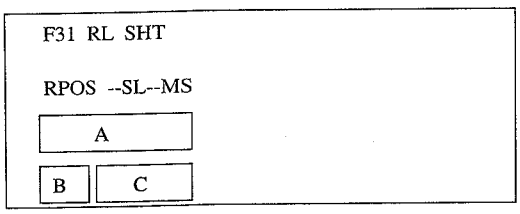
(DVR-20)

[<] + [ ] (f0) : Shifts in the M-cassette direction only when this key is pressed.
[<] (f1) : Shifts in the M-cassette direction only when this key is pressed.
[>] (f2) : Shifts in the M-cassette direction only when this key is pressed.
[>] + [ ] (f3) : Shifts in the S-cassette direction only when this key is pressed.

(DVR-28)

[<] + [ ] (f0) : Shifts in the L-cassette direction and in the reel stopper pin down direction only when this key is pressed.
[<] (f1) : Shifts in the L-cassette direction and not shift in the reel stopper pin down direction only when this key is pressed.
[>] (f2) : Shifts in the S-cassette direction and not shift in the reel stopper pin down derection only when this key is pressed.
[>] + [ ] (f3) : Shifts in the S-cassette direction and in the reel stopper pin down direction only when this key is pressed.

Control Panel Display



A : No display appears.

B : DVR-28 reel shift position data

--XX
DVR-28 REEL SHIFT POSITION DATA
(L-CASSETTE POSITION DATA > S-CASSETTE POSITION DATA)

Specifications

1. 6Fh ± 01h = A and value A - 30h = NOVRAM $A8AD when the reel shifts from L-cassette position to M-cassette position and when the take-up reel spring contracts.
2. Value A ± 03h = B and value B + 30h = NOVRAM $A8AE when the reel shifts from S-cassette position to M-cassette position and when the supply reel spring contracts.
3. The value when the reel shifts to the S-cassette position and when the take-up reel spring contracts is NOVRAM $A8AC.
4. The value when the reel shifts to the L-cassette position and when the supply reel spring contracts is NOVRAM $A8AF.

C : Reel shift sensor state

DVR-20

------XXB

1 : NO 0 : REEL SHIFT S-POSITION

1 : NO 0 : REEL SHIFT M-POSITION

DVR-28

--XX----B

1 : NO 0 : L-DIRECTION SPRING (S-REEL) SHORT

1 : NO 0 : S-DIRECTION SPRING (T-REEL) SHORT

Specifications

DVR-28

The sensor data must change from "1" to "0" in the position where each spring contracts by 1 mm.

SP F32 : CASSETTE COMPARTMENT ALL DRIVER TEST

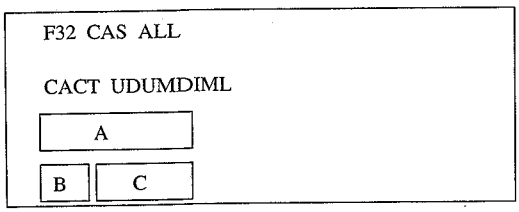
Outline

The cassette compartment driver test can be performed with the DVR-20.
The inner cassette compartment driver test can be performed with the DVR-28.
The (inner) cassette compartment is shifted to the specified position by the function key operation.
Unlike the ordinary operation, the operation in this test mode uses no sensor information.
Therefore, the motor is not stopped automatically, and the variable power is not controlled.
Be careful not to damage the mechanical system and tape during test mode operation.
Take care that the cassette and cassette compartment do not collide with the reel table and threading arm.
The VTR does not operate ordinarily during test mode operation.
During operation completion, cancel the test mode by entering the F30 test mode or turning off the power.
This test mode is canceled when the next test mode is entered.

Key Operation

[<] (f1) : Shifts in the (inner) cassette compartment-down direction only when this key is pressed.
[>] (f2) : Shifts in the (inner) cassette compartment-up direction only when this key is pressed.

Control Panel Display



A : No display appears.

B : Cassette compartment control data

DVR-20

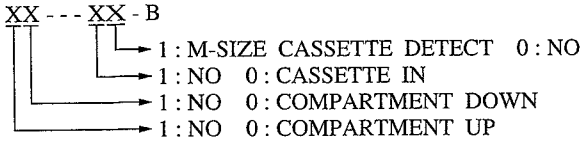
- - XX
  - XX → CASSETTE COMPARTMENT CONTROL DATA

DVR-28

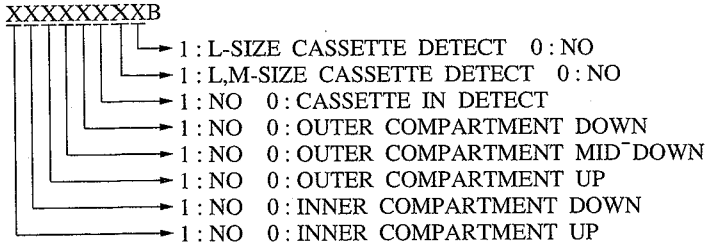
XXXX
- XX → INNER CASSETTE COMPARTMENT CONTROL DATA
- XX → OUTER CASSETTE COMPARTMENT CONTROL DATA

C : Sensor state of the cassette compartment

DVR-20



DVR-28



SP F33 : INNER CASSETTE COMPARTMENT DRIVER TEST

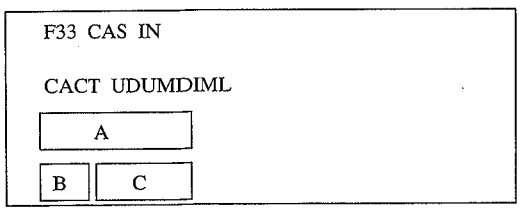
Outline

The cassette compartment driver test can be performed with the DVR-20.
The inner cassette compartment driver test can be performed with the DVR-28.
The (inner) cassette compartment is shifted to the specified position by the function key operation.
Unlike the ordinary operation, the operation in this test mode uses no sensor information.
Therefore, the motor is not stopped automatically, and the variable power is not controlled.
Be careful not to damage the mechanical system and tape during test mode operation.
Take care that the cassette and cassette compartment do not collide with the reel table and threading arm.
The VTR does not operate ordinarily during test mode operation.
During operation completion, cancel the test mode by entering the F30 test mode or turning off the power.
This test mode is canceled when the next test mode is entered.

Key Operation

[<] (f1) : Shifts in the inner cassette compartment-down direction only when this key is pressed.
[>] (f2) : Shifts in the inner cassette compartment-up direction only when this key is pressed.

Control Panel Display



A : No display appears.

B : Cassette compartment control data

DVR-20
--XX
→ CASSETTE COMPARTMENT CONTROL DATA

DVR-28
XXXX
→ INNER CASSETTE COMPARTMENT CONTROL DATA
→ OUTER CASSETTE COMPARTMENT CONTROL DATA

C : Sensor state of the cassette compartment

DVR-20
XX---XX-B
→ 1 : M-SIZE CASSETTE DETECT 0 : NO
→ 1 : NO 0 : CASSETTE IN
→ 1 : NO 0 : COMPARTMENT DOWN
→ 1 : NO 0 : COMPARTMENT UP

DVR-28
XXXXXXXXB
→ 1 : L-SIZE CASSETTE DETECT 0 : NO
→ 1 : L,M-SIZE CASSETTE DETECT 0 : NO
→ 1 : NO 0 : CASSETTE IN DETECT
→ 1 : NO 0 : OUTER COMPARTMENT DOWN
→ 1 : NO 0 : OUTER COMPARTMENT MID DOWN
→ 1 : NO 0 : OUTER COMPARTMENT UP
→ 1 : NO 0 : INNER COMPARTMENT DOWN
→ 1 : NO 0 : INNER COMPARTMENT UP

SP F34 : OUTER CASSETTE COMPARTMENT DRIVER TEST

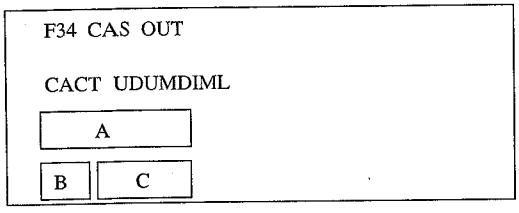
Outline

The cassett compartment driver test operation can be performed with the DVR-20.
The outer cassette compartment driver test operation can be performed with the DVR-28.
The outer cassette compartment is shifted in the specified direction by the function key operation.
Unlike the ordinary operation, the operation in this test mode uses no sensor information.
Therefore, the motor is not stopped automatically, and the variable power is not controlled.
Be careful not to damage the mechanical system and tape during test mode operation.
Take care that the cassette and cassette compartment do not collide with the reel table and threading arm.
This test mode becomes the same in operation as the F32 test mode when it is selected in DVR-20.
The VTR does not operate ordinarily during test mode operation.
During operation completion, cancel the test mode by entering the F30 test mode or turning off the power.
This test mode is canceled when the next test mode is entered.

Key Operation

[<] (f1) : Shifts in the outer cassette compartment-down direction only when this key is pressed.
[>] (f2) : Shifts in the outer cassette compartment-up direction only when this key is pressed.

Control Panel Display



A : No display appears.

B : Cassette compartment control data

DVR-20
--XX
└→ CASSETTE COMPARTMENT CONTROL DATA

DVR-28
XXXX
└→ INNER CASSETTE COMPARTMENT CONTROL DATA
└→ OUTER CASSETTE COMPARTMENT CONTROL DATA

C : Sensor state of the cassette compartment

DVR-20
XX---XX-B
└→ 1 : M-SIZE CASSETTE DETECT 0 : NO
└→ 1 : NO 0 : CASSETTE IN
└→ 1 : NO 0 : COMPARTMENT DOWN
└→ 1 : NO 0 : COMPARTMENT UP

DVR-28
XXXXXXXXB
└→ 1 : L-SIZE CASSETTE DETECT 0 : NO
└→ 1 : L,M-SIZE CASSETTE DETECT 0 : NO
└→ 1 : NO 0 : CASSETTE IN DETECT
└→ 1 : NO 0 : OUTER COMPARTMENT DOWN
└→ 1 : NO 0 : OUTER COMPARTMENT MID DOWN
└→ 1 : NO 0 : OUTER COMPARTMENT UP
└→ 1 : NO 0 : INNER COMPARTMENT DOWN
└→ 1 : NO 0 : INNER COMPARTMENT UP

SP F35 : THREAD DRIVER TEST

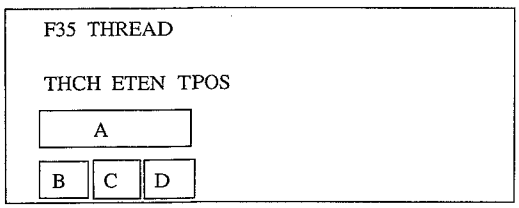
Outline

The threading driver test operation can be performed in this test mode.
The threading arm is shifted in the specified direction by the function key operation.
Unlike the ordinary operation, the operation in this test mode uses no sensor information.
Therefore, the motor is not stopped automatically, and the variable power is not controlled.
Be careful not to damage the mechanical system and tape during test mode operation.
Take care that the tape is not loaded, the pinch roller is not turned off, and the tape does not collide with the cassette and cassette compartment.
The VTR does not operate ordinarily during test mode operation.
During operation completion, cancel the test mode by entering the F30 test mode or turning off the power.
This test mode is canceled when the next test mode is entered.

Key Operation

[<] + [ ] (f0) : Shifts in the threading direction.
[<] (f1) : Shifts in the threading direction only when this key is pressed.
[>] (f2) : Shifts in the unthreading direction only when this key is pressed.
[>] + [ ] (f3) : Shifts in the unthreading direction.

Control Panel Display



A : No display appears.

B : Threading arm control data

--XX
└→ THREADING ARM CONTROL DATA

C : Tension control reference data during threading

--XX
└→ TENSION REFERENCE DATA (1g=16 / 25h)

D : Threading arm position data

--XX
└→ THREADING POSITION DATA

Specifications

0EDh in the threading standard position is written into DATA = $A8A1 in the unthreading standard position.

SP F36 : MAIN PINCH DRIVER TEST

Outline

The main pinch driver test operation can be performed in this test mode.
The specified main pinch roller is turned on or off by the function key operation.
Unlike the ordinary operation, the operation in this test mode uses no sensor information.
Be careful not to damage the mechanical system and tape during test mode operation.
Pay attention to the threading arm position.
This test mode must be performed when the threading arm is in the threading or unthreading position.
The VTR does not operate ordinarily during test mode operation.
During operation completion, cancel the test mode by entering the F30 test mode or turning off the power.
This test mode is canceled when the next test mode is entered.

Key Operation

[<] (f1) : Turns off the main pinch roller.
[>] (f2) : Turns on the main pinch roller only when this key is pressed.
[>] + [ ] (f3) : Turns on the main pinch roller.

Control Panel Display

F36 MAIN PINCH

SP F37 : SUB PINCH DRIVER TEST

Outline

The sub pinch driver test operation can be performed in this test mode.
The specified sub pinch roller is turned on or off by the function key operation.
Unlike the ordinary operation, the operation in this test mode uses no sensor information.
Therefore, the motor is not canceled automatically, and the variable power is not controlled.
Be careful not to damage the mechanical system and tape during test mode operation.
Pay attention to the threading arm position.
This test mode must be performed when the threading arm is in the threading or unthreading position.
The VTR does not operate ordinarily during test mode operation.
During operation completion, cancel the test mode by entering the F30 test mode or turning off the power.
This test mode is canceled when the next test mode is entered.

Key Operation

[<] (f1) : Turns off the sub pinch roller.
[>] (f2) : Turns on the sub pinch roller only when this key is pressed.
[>]+[ ] (f3) : Turns on the sub pinch roller.

Control Panel Display

F37 SUB PINCH

SP F38 : HEAD CLEANER DRIVER TEST

Outline

The head cleaner driver test operation can be performed in this test mode.
The head cleaner is turned on or off by the function key operation.
Be careful not to damage the mechanical system and tape during test mode operation.
The VTR does not operate ordinarily during test mode operation.
During operation completion, cancel the test mode by entering the F30 test mode or turning off the power.
This test mode is canceled when the next test mode is entered.

Key Operation

[<] + [ ] (f0) : Turns or off the head cleaner.
[<] (f1) : Turns on the head cleaner only when this key is pressed.
[>] (f2) : Turns off the head cleaner.

Control Panel Display

F38 HEAD CLR

SP F39 : TAPE CLEANER DRIVER TEST

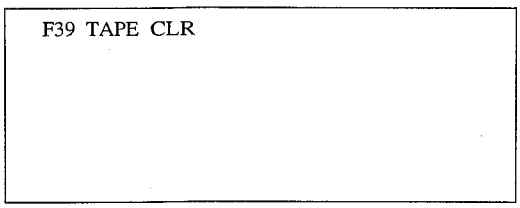
Outline

The tape cleaner driver test operation can be performed in this test mode.
The tape cleaner is turned on or off by the function key operation.
Be careful not to damage the mechanical system and tape during test mode operation.
The VTR does not operate ordinarily during test mode operation.
During operation completion, cancel the test mode by entering the F30 test mode or turning off the power.
This test mode is canceled when the next test mode is entered.

Key Operation

[<]+[ ] (f0) : Turns on the tape cleaner.
[<] (f1) : Turns on the tape cleaner only when this key is pressed.
[>] (f2) : Turns off the tape cleaner.

Control Panel Display



SP F3A : DRUM DRIVER TEST

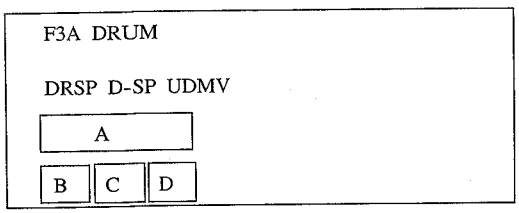
Outline

The drum driver test operation can be performed in this test mode.
The drum is rotated by the function key operation.
Be careful not to damage the mechanical system and tape during test mode operation.
The VTR does not operate ordinarily during test mode operation.
During operation completion, cancel the test mode by entering the F30 test mode or turning off the power.
This test mode is canceled when the next test mode is entered.

Key operation

[<] (f1) : Stops the drum rotation.
[>] (f2) : Rotates the drum at low speed.
[>] + [ ] (f3) : Rotates the drum at high speed.

Control Panel Display



A : No display appears.

B : Drum speed is displayed.
NTSC: 30h = 48 normal speed
PAL : 40h = 64 normal speed

C : No display appears

D : Control data of drum is displayed.

3-6-5. SV TEST MODE MENU

Command List

Command	Function
$, $$	MEMORY READ / WRITE
= 0	SP, SY, SV, DT RESET
B0	TEST MODE OFF (Cancels B mode)
B12	ACCEL SELECT
B15	DRUM PG ADJUST
C0	TEST MODE OFF (Cancels C mode)
C11	AUTO SERVO ADJUST
C12	CAPSTAN FG OFFSET ADJUST
C13	T-REEL FG OFFSET ADJUST
C14	S-REEL FG OFFSET ADJUST
C15	TAPE END SENSOR GAIN ADJUST
C16	TAPE TOP SENSOR GAIN ADJUST
C17	TAPE SAG SENSOR GAIN ADJUST
C18	T-REEL TORQUE ADJUST
C19	S-REEL TORQUE ADJUST
C1A	CAPSTAN NORMAL VELOCITY ADJUST
C1B	CAPSTAN FORMAT VELOCITY ADJUST
C1C	CAPSTAN FG GAIN ADJUST
C1D	DRUM PG POLARITY ADJUST
C1E	DRUM VELOCITY ADJUST
C28	S-TENSION OFFSET ADJUST
C29	S-TENSION GAIN ADJUST
C2A	T-TENSION OFFSET ADJUST
C2B	T-TENSION GAIN ADJUST
D0	TEST MODE OFF (Cancels D mode)
D11	AUTO SERVO CHECK
D12	CAPSTAN FG OFFSET CHECK
D13	T-REEL FG OFFSET CHECK
D14	S-REEL FG OFFSET ADJUST
D15	TAPE END SENSOR GAIN CHECK
D16	TAPE TOP SENSOR GAIN CHECK
D17	TAPE SAG SENSOR GAIN CHECK
D18	T-REEL TORQUE CHECK
D19	S-REEL TORQUE CHECK
D1A	CAPSTAN MOTOR CHECK

Command	Function
D1B	CAPSTAN NORMAL VELOCITY CHECK
D1C	CAPSTAN FORMAT VELOCITY CHECK
D1D	CAPSTAN FG GAIN CHECK
D1E	T-REEL BRAKE CHECK
D1F	S-REEL BRAKE CHECK
D21	T-REEL TENSION CHECK
D22	S-REEL TENSION CHECK
D23	DRUM LOCK CHECK
D24	DRUM PG/FG POLARITY CHECK
D25	DRUM VELOCITY CHECK
D26	DRUM PG JITTER CHECK
D27	THREAD CHECK
D28	CASSETTE COMPERTMENT CHECK
D29	REEL SHIFT CHECK
D2A	SENSOR CHECK
D2F	DRUM WAVEFORM CHECK

SV $, $$ MEMORY READ / WRITE

Outline

This command can read or write the data of the memory specified by SV CPU in bytes or words.
$ is used to read or write data in bytes, and $$ to read or write it in words.
This command is used in the factory.
If the NOVRAM data is changed, the VTR does not operate normally.

Note : This command cannot change NOVRAM data.
To change the NOVRAM data, enter the SP $, $$ command in an SP test mode menu.

SV = 0 SP, SY, SV, DT RESET

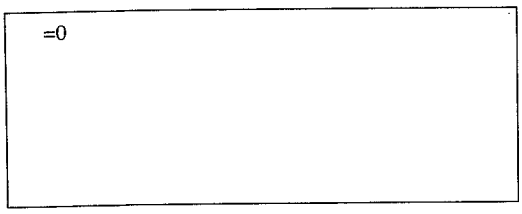
Outline

Entering this command can reset the SP, SV, SY and DT boards.

Operation

Enter the = 0 command using the function keys and numeric keypad on the control panel.

Control Panel Display



SV B12 ACCEL SELECT

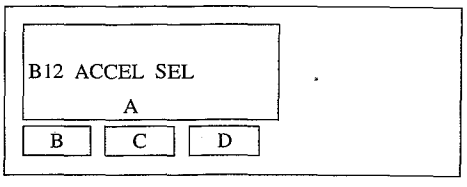
Outline

This command selects tape acceleration / slowdown efficiency and can control the acceleration / slowdown function of shuttle and capstan.
Mode 0 ~ 2 correspond to ACCEL 1 ~ 3 of SET UP : INTERFACE menu.
Mode 3 can be set by test mode, not by SET UP : INTERFACE menu.
After adjustment, execute a B0 command and terminate this command.
Return to the setting mode of SET UP : INTERFACE menu.

Key Operation

[<] (f1) ON : Mode number decreases one at a time.
[>] (f2) ON : Mode number increases one at a time.

Control Panel Display



A : No display appears.

B : No display appears.

C : XXXX : Display the mode number.
0 : (Corresponds to ACCEL : 1 of SET UP : INTERFACE menu)
ordinary acceleration / slowdown
1 : (Corresponds to ACCEL : 2 of SET UP : INTERFACE menu)
The slowdown efficiency is same as mode 0.
2 : (Corresponds to ACCEL : 3 of SET UP : INTERFACE menu)
The slowdown efficiency is same as mode 0.
3 : Shuttle acceleration / slowdown efficiency is limited to quarter.
Capstan acceleration efficiency is limited to half.
Capstan slowdown efficiency is limited to quarter.
This mode is used when rewinding long kept tape or the tape under unfavorable environment.

D : No display appears.

SV B15 DRUM PG ALIGNMENT

Outline

This command adjusts the PG phase of a drum.
The tracking phase is then set to the FIX position and the PG phase memory can be operated.
After adjustment is completed, NOVRAM WRITE is required from the SP checker.
The address to be changed is $$A8D1 of SP CPU.
The tracking is forcibly set to FIX irrespective of the VTR tracking menu while this command is executed. Therefore, after adjustment is completed, execute a B0 command and terminate this command.

Key Operation

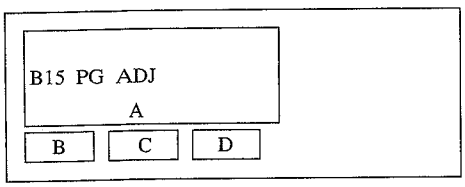
[<]+[ ] (f0) ON : The reference value (NTSC : 16B8H, PAL : 17A8H) is set when this key is pressed for more than one second.

[<] (f1) ON : The offset value decreases 4H at a time.

[>] (f2) ON : The offset value increases 4H at a time.

[>]+[ ] (f3) ON : The reference value (NTSC : 16B8H, PAL : 17A8H) is set while this key is pressed.

Control Panel Display



A : No display appears.

B : No display appears.

C : XXXX : Displays the adjustment value (NOVRAM $$A8D1) of a drum PG phase.
Memorized by executing NOVRAM WRITE from the SP checker after adjustment is completed.

D : No display appears.

Specification

The reference point of a reference tape (TP102 on the REC-11 board) and the trailing edge of a reference signal on the EN-99 board (TP2 on the EN-99 board) must be within 0 ± 1 us.

SV C11 AUTOMATIC SERVO ALIGNMENT

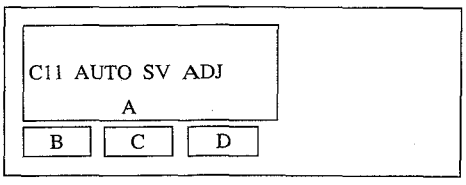
Outline

This command automatically adjusts the servo system.
It continuously performs the nine automatic adjustments of "C12" to "C1E".
After adjustment is completed, NOVRAM WRITE is required from the SP checker. For the address to be changed, refer to each item.
The VTR does not operate ordinarily during test mode operation.
During operation completion, cancel the test mode by entering the C0 test mode or turning off the power.

Key Operation

[>] (f2) ON : Starts the automatic adjustment.

Control Panel Display



A : The messages below are displayed.

"XXXXXXXXXXX SRT" : Displays the automatic adjustment command in execution.
"AUTO SV ADJ FIN" : Indicates that the automatic adjustment by C11 is completed.
"ERROR !!
XXXXXXXXXX" : Indicates that abnormality occurred. For more details, refer to each item.

B : Refer to each item.

C : Refer to each item.

D : Refer to each item.

SV C12 CAPSTAN FG OFFSET ALIGNMENT

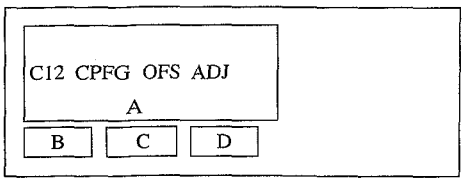
Outline

This command adjusts the capstan FG offset.
It adjusts the FG offset value so that the duty ratio of capstan FG A and FG B output pulses is 50 %.
The normal speed (C1A command), fast format speed (C1B command), and gain (C1 command) must be readjusted when the offset voltage is readjusted.
After adjustment is completed, NOVRAM WRITE is required from the SP checker.
The addresses to be changed are $$A880 and $$A882 of SP CPU.
The VTR does not operate ordinarily during test mode operation.
During operation completion, cancel the test mode by entering the C0 test mode or turning off the power.

Key Operation

[>] (f2) ON : Starts the automatic adjustment.

Control Panel Display



A : The messages below are displayed.
"CPFG OFS AJ SRT" : Indicates that the automatic adjustment of a "C12" capstan FG offset is being executed.
"CPFG OFS AJ FIN" : Indicates that the automatic adjustment by "C12" is completed normally.

The error message below is displayed when abnormality is detected during adjustment.
The adjustment is then interrupted.
"ERROR !!
CAPSTAN FG" : No capstan FG pulse can be detected.

For countermeasures, refer to Section 3-6-8. Countermeasures for Error Messages.

B : 0202 : Indicates the state in which "C12" is selected.

C : XXXX : Indicates the adjustment value (NOVRAM $$A880) of a capstan FG A pulse.
Memorized by executing NOVRAM WRITE from the SP checker after adjustment is completed.

D: XXXX : Indicates the adjustment value (NOVRAM $$A882) of a capstan FG B pulse.
Memorized by executing NOVRAM WRITE from the SP checker after adjustment is completed.

SV C13 T-REEL FG OFFSET ALIGNMENT

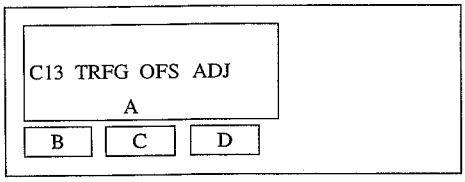
Outline

This command adjusts the take-up reel FG offset.
It adjusts the FG offset value so that the duty ratio of take-up reel FG A and FG B output pulses is 50 %.
After adjustment is completed, NOVRAM WRITE is required from the SP checker.
The addresses to be changed are $$A888 and $$A88A of SP CPU.
The VTR does not operate ordinarily during test mode operation.
During operation completion, cancel the test mode by entering the C0 test mode or turning off the power.

Key Operation

[>] (f2) ON : Starts the automatic adjustment.

Control Panel Display



A : The messages below are displayed.

"TRFG OFS AJ SRT" : Indicates that the automatic adjustment of a "C13" take-up reel FG offset is being executed.
"TRFG OFS AJ FIN" : Indicates that the automatic adjustment by "C13" is completed normally.

The error message below is displayed when abnormality is detected during adjustment.
The adjustment is then interrupted.
"ERROR !!
T-REEL FG" : No take-up reel FG pulse can be detected.

For countermeasures, refer to Section 3-6-8. Countermeasures for Error Messages.

B : 0303 : Indicates the state in which "C13" is selected.

C : XXXX : Indicates the adjustment value (NOVRAM $$A888) of a take-up reel motor FG A pulse.
Memorized by executing NOVRAM WRITE from the SP checker after adjustment is completed.

D : XXXX : Indicates the adjustment value (NOVRAM $$A88A) of a take-up reel motor FG B pulse.
Memorized by executing NOVRAM WRITE form the SP checker after adjustment is completed.

SV C14 S-REEL FG OFFSET ALIGNMENT

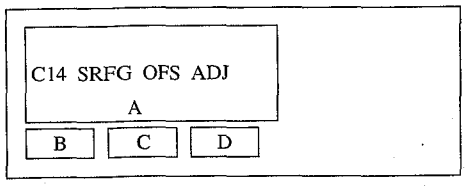
Outline

This command adjusts the supply reel FG offset.
It adjusts the FG offset value so that the duty ratio of supply reel FG A and FG B pulses is 50 %.
After adjustment is completed, NOVRAM WRITE is required from the SP checker.
The addresses to be changed are $$A884 and $$A886 of SP CPU.
The VTR does not operate ordinarily during test mode operation.
During operation completion, cancel the test mode by entering the C0 test mode or turning off the power.

Key Operation

[>] (f2) ON : Starts the automatic adjustment.

Control Panel Display



A : The messages below are displayed.
"SRFG OFS AJ SRT" : Indicates that the automatic adjustment of a "C14" supply reel FG offset is being executed.
"SRFG OFS AJ FIN" : Indicates that the automatic adjustment by "C14" is completed normally.

The error message below is displayed when abnormality is detected during adjustment.
The adjustment is then interrupted.

"ERROR !!
S-REEL FG" : No supply reel FG pulse can be detected.

For countermeasures, refer to Section 3-6-8. Countermeasures, for Error Messages.

B : 0404 : Indicates the state in which "C14" is selected.

C : XXXX : Indicates the adjustment value (NOVRAM $$A884) of a supply reel motor FG A pulse.
Memorized by executing NOVRAM WRITE from the SP checker after adjustment is completed.

D: XXXX : Indicates the adjustment value (NOVRAM $$A886) of a supply reel motor FG B pulse.
Memorized by executing NOVRAM WRITE from the SP checker after adjustment is completed.

SV C15 TAPE END SENSOR GAIN ALIGNMENT

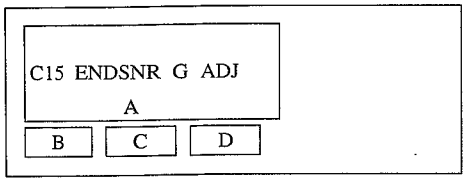
Outline

This command adjusts the gain of a tape end sensor.
It adjusts the value of an electronic volume control so that the output voltage of the tape end sensor is 2.4 V.
After adjustment is completed, NOVRAM WRITE is required from the SP checker.
The address to be changed is $A89E of SP CPU.
The VTR does not operate ordinarily during test mode operation.
During operation completion, cancel the test mode by entering the C0 test mode or turning off the power.

Key Operation

[>] (f2) ON : Starts the automatic adjustment.

Control Panel Display



A : The messages below are displayed.
"ENDSNR G AJ SRT" : Indicates that the gain adjustment of a "C15" end sensor is being executed.
"ENDSNR G AJ FIN" : Indicates that the automatic adjustment by "C15" is completed normally.

The error message below is detected when abnormality is detected during adjustment.
The adjustment is then interrupted.
"ERROR !!
END SENSOR" : The output voltage of an end sensor cannot be adjusted to 2.4 ± 0.1 V.

For countermeasures, refer to Section 3-6-8. Countermeasures for Error Messages.

B : 0505 : Indicates the state in which "C15" is selected.

C : --XX : Indicates the adjustment value (NOVRAM $A89E) of an end sensor gain.
Memorized by executing NOVRAM WRITE from the SP checker after adjustment is completed.

D : --XX : Indicates the output value of an end sensor. 0 to 5 V are represented as 00H to FFH.
2.4 V is 7AH.

SV C16 TAPE TOP SENSOR GAIN ALIGNMENT

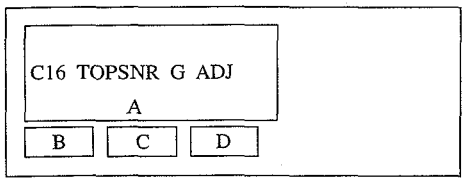
Outline

This command adjusts the gain of a tape top sensor.
It adjusts the value of an electronic volume control so that the output voltage of the tape top sensor is 2.4 V.
After adjustment is completed, NOVRAM WRITE is required from the SP checker.
The address to be changed is $A89C of SP CPU.
The VTR does not operate ordinarily during test mode operation.
During operation completion, cancel the test mode by entering the C0 test mode or turning off the power.

Key Operation

[>] (f2) ON : Starts the automatic adjustment.

Control Panel Display



A : The messages below are displayed.

"TOPSNR G AJ SRT : Indicates that the gain adjustment of a "C16" top sensor is being executed.
"TOPSNR G AJ FIN" : Indicates that the automatic adjustment by "C16" is completed normally.

The error message below is displayed when abnormality is detected during adjustment.
The adjustment is then interrupted.
"ERROR !!
TOP SENSOR" : The output voltage of a top sensor cannot be adjusted to 2.4 ± 0.1 V.

For countermeasures, refer to Section 3-6-8. Countermeasures for Error Messages.

B : 0606 : Indicates the state in which "C16" is selected.

C : --XX : Indicates the adjustment value (NOVRAM $A89C) of a top sensor gain.
Memorized by executing NOVRAM WRITE from the SP checker after adjustment is completed.

D : --XX : Indicates the output value of a top sensor. 0 to 5 V are represented as 00H to FFH.
2.4 V is 7AH.

SV C17 TAPE CENTER (SAG) SENSOR GAIN ALIGNMENT

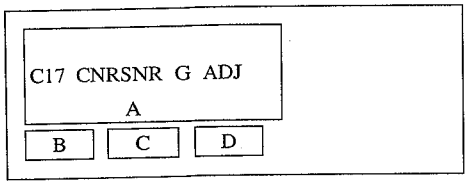
Outline

This command adjusts the gain of a tape center (sag) sensor.
It adjusts the value of an electronic volume control so that the output voltage of the tape center sensor is 2.4 V.
After adjustment is completed, NOVRAM WRITE is required from the SP checker.
The address to be changed is $A89D of SP CPU.
The VTR does not operate ordinarily during test mode operation.
During operation completion, cancel the test mode by entering the C0 test mode or turning off the power.

Key Operation

[>] (f2) ON : Starts the automatic adjustment.

Control Panel Display



A : The messages below are displayed.
"CNRSNR G AJ SRT" : Indicates that the gain adjustment of a "C17" center sensor is being executed.
"CNRSNR G AJ FIN" : Indicates that the automatic adjustment by "C17" is completed normally.

The error message below is displayed when abnormality is detected during adjustment.
The adjustment is then interrupted.
"ERROR !!
CENTER SENSOR" : The output voltage of a center sensor cannot be adjusted to 2.4 ± 0.1 V.

For countermeasures, refer to Section 3-6-8. Countermeasures for Error Messages.

B : 0707 : Indicates the state in which "C17" is selected.

C : --XX : Indicates the adjustment value (NOVRAM $A89D) of a center sensor gain.
Memorized by executing NOVRAM WRITE from the SP checker after adjustment is completed.

D : --XX : Indicates the output value of a center sensor. 0 to 5 V are represented as 00H to FFH.
2.4 V is 7AH.

SV C18 T-REEL MOTOR TORQUE ALIGNMENT

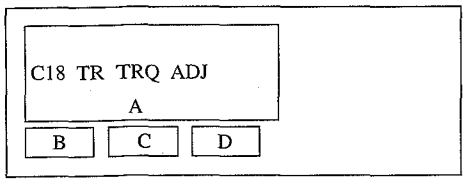
Outline

This command adjusts the output torque of a take-up reel motor.
It measures the torque constant of the take-up reel motor and calculates the correction value for a standard torque constant.
A take-up reel FG offset voltage must be adjusted during this adjustment (using a C13 command).
After adjustment is completed, NOVRAM WRITE is required from the SP checker.
The address to be changed is $A88F of SP CPU.
The VTR does not operate ordinarily during test mode operation.
During operation completion, cancel the test mode by entering the C0 test mode or turning off the power.

Key Operation

[>] (f2) ON : Starts the automatic adjustment.

Control Panel Display



A : The messages below are displayed.
"TR TRQ ADJ SRT" : Indicates that the torque adjustment of a "C18" take-up reel is being executed.
"TR TRQ ADJ FIN" : Indicates that the automatic adjustment by "C18" is completed normally.

The error message below is displayed when abnormality is detected during adjustment.
"ERROR !!
T-REEL TORQUE" : No take-up reel torque can be adjusted.

For countermeasures, refer to Section 3-6-8. Countermeasures for Error Messages.

B : 0808 : Indicates the state in which "C18" is selected.

C : XXXX : Indicates the mean value of measured acceleration
(the number of reel FG waves that change for approximately 80 ms).

D : XX-- : Indicates the correction value (NOVRAM $A88F) of a take-up reel torque.
-25 % to +25 % are represented as 00H to FFH.
The reference value is 80H.
Memorized by executing NOVRAM WRITE from the SP checker after adjustment is completed.

SV C19 S-REEL MOTOR TORQUE ALIGNMENT

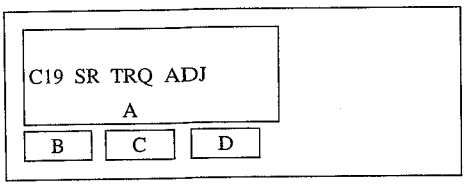
Outline

This command adjusts the output torque of a supply reel motor.
It measures the torque constant of the supply reel motor and calculates the correction value for a standard torque constant.
A supply reel FG offset voltage must be adjusted during this adjustment (using a C14 command).
After adjustment is completed, NOVRAM WRITE is required from the SP checker.
The address to be changed is $A88E of SP CPU.
The VTR does not operate ordinarily during test mode operation.
During operation completion, cancel the test mode by entering the C0 test mode or turning off the power.

Key Operation

[>] (f2) ON : Starts the automatic adjustment.

Control Panel Display



A : The messages below are displayed.
"SR TRQ ADJ SRT" : Indicates that the torque adjustment of a "C19" supply reel is being executed.
"SR TRQ ADJ FIN" : Indicates that the automatic adjustment by "C19" is completed normally.

The error message below is displayed when abnormality is detected during adjustment.
The adjustment is then interrupted.
"ERROR !!
S-REEL TORQUE" : No supply reel torque can be adjusted.

For countermeasures, refer to Section 3-6-8. Countermeasures for Error Messages.

B : 0909 : Indicates the state in which "C19" is selected.

C : XXXX : Indicates the mean value of measured acceleration
(the number of reel FG waves that change for approximately 80 ms).

D : --XX : Indicates the correction value (NOVRAM $A88E) of a supply reel torque.
-25 % to +25 % are represented as 00H to FFH. The reference value is 80H.
Memorized by executing NOVRAM WRITE from the SP checker after adjustment is completed.

SV C1A CAPSTAN NORMAL VELOCITY ALIGNMENT

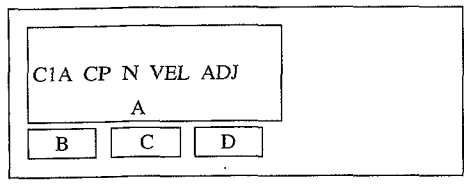
Outline

This command rotates the capstan motor at REC speed and adjusts the reference value so that the output from a speed error measuring instrument is minimum.
A capstan offset voltage must be adjusted during this adjustment (using a C12 command).
After adjustment is completed, NOVRAM WRITE is required from the SP checker.
The address to be changed is $$A8C2 of SP CPU.
The VTR does not operate ordinarily during test mode operation.
During operation completion, cancel the test mode by entering the C0 test mode or turning off the power.

Key Operation

[>] (f2) ON: Starts the automatic adjustment.

Control Panel Display



A : The messages below are displayed.
"CP N VEL AJ SRT" : Indicates that the REC speed adjustment of a "C1A" capstan is being executed.
"CP N VEL AJ FIN" : Indicates that the automatic adjustment by "C1A" is completed normally.

The error messages below are displayed when abnormality is detected during adjustment.
The adjustment is then interrupted.
"ERROR !!
CAPSTAN MOTOR": A capstan motor cannot be rotated at REC speed.
"ERROR !!
CP NORM VELO" : The output from a speed error measuring instrument cannot be minimum after 20-second adjustment.
"ERROR !!
CP NVL UNSTBL" : The driving voltage of a capstan motor fluctuates excessively.

For countermeasures, refer to Section 3-6-8. Countermeasures for Error Messages.

B : 0A0A : Indicates the state in which "C1A" is selected.

C : XXXX : Indicates the capstan speed.
The REC speed corresponds to 0FA0H (= 40000).

D : XXXX : Indicates the reference value (NOVRAM $$A8C2) OF a speed error measuring instrument.
The reference value is 2DEEH.
Memorized by executing NOVRAM WRITE from the SP checker after adjustment is completed.

SV C1B CAPSTAN F. FORMAT VELOCITY ALIGNMENT

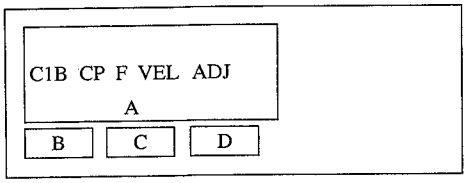
Outline

This command rotates the capstan motor at fast format speed and adjusts the reference value so that the output from a speed error measuring instrument is minimum.
A capstan offset voltage must be adjusted during this adjustment (using a C12 command).
After adjustment is completed, NOVRAM WRITE is required from the SP checker.
The address to be changed is $$A8C4 of SP CPU.
The VTR does not operate ordinarily during test mode operation.
During operation completion, cancel the test mode by entering the C0 test mode or turning off the power.

Key Operation

[>] (f2) ON: Starts the automatic adjustment.

Control Panel Display



A : The messages below are displayed.
"CP F VEL AJ SRT" : Indicates that the speed adjustment of a "C1B" capstan fast format is being executed.
"CP F VEL AJ FIN" : Indicates that the automatic adjustment by "C1B" is completed normally.

The error messages below are displayed when abnormality is detected during adjustment.
The adjustment is then interrupted.
"ERROR !!
CAPSTAN MOTOR": A capstan motor cannot be rotate at fast format speed.
"ERROR !!
CP FVL UNSTBL" : The driving voltage of a capstan motor fluctuates excessively.
"ERROR !!
CP FFOR VELO" : The output from a speed error measuring instrument cannot be minimum after 20-second adjustment.

For countermeasures, refer to Section 3-6-8. Countermeasures for Error Messages.

B : 0B0B : Indicates the state in which "C1B" is selected.

C : XXXX : Indicates the capstan speed.
The fast format speed corresponds to 2EE0H (= 12000).

D : XXXX : Indicates the reference value (NOVRAM $$A8C4) of a speed error measuring instrument.
The reference value is 2DEEH.
Memorized by executing NOVRAM WRITE from the SP checker after adjustment is completed.

SV C1C CAPSTAN FG GAIN ALIGNMENT

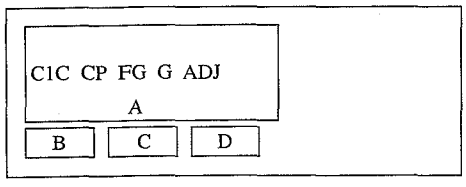
Outline

This command adjusts the FG gain of a capstan.
It measures the FG amplitude of the capstan and adjusts the internal gain constant.
A capstan offset voltage must be adjusted during this adjustment (using a C12 command).
After adjustment is completed, NOVRAM WRITE is required from the SP checker.
The addresses to be changed are $A88C and $A88D of SP CPU.
The VTR does not operate ordinarily during test mode operation.
During operation completion, cancel the test mode by entering the C0 test mode or turning off the power.

Key Operation

[>] (f2) ON : Starts the automatic adjustment.

Control Panel Display



A : The messages below are displayed.
"CP FG G ADJ SRT" : Indicates that the FG gain adjustment of a "C1C" capstan is being executed.
"CP FG G ADJ FIN" : Indicates that the automatic adjustment by "C1C" is completed normally.

The error messages below are displayed when abnormality is detected during adjustment.
The adjustment is then interrupted.
"ERROR !!
CAPSTAN MOTOR": A capstan motor cannot be rotated at specified speed.
"ERROR !!
CAP FG LEVEL" : The FG amplitude of a capstan motor is abnormal.

For countermeasures, refer to Section 3-6-8. Countermeasures for Error Messages.

B : 0C0C : Indicates the state in which "C1C" is selected.

C : XXXX : Indicates the capstan speed.
The REC speed corresponds to 0FA0H (= 4000).

D : --XX : Indicates the A-phase correction value (NOVRAM $A88C) of an internal gain constant.
XX-- : Indicates the B-phase correction value (NOVRAM $A88D) of an internal gain constant.
01H is a correction amount of approximately 0.8 %. The reference value is 00H.
Memorized by executing NOVRAM WRITE from the SP checker after adjustment is completed.

SV C1D DRUM PG POLARITY ALIGNMENT

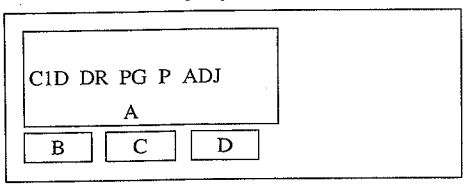
Outline

This command adjusts the polarity of a drum FG for the drum PG.
The adjustment is completed in approximately five seconds.
A drum motor speed must be readjusted (using a C1E command) when the polarity is readjusted.
After adjustment is completed, NOVRAM WRITE is required from the SP checker.
The address to be changed is $A8D0 of SP CPU.
The VTR does not operate ordinarily during test mode operation.
During operation completion, cancel the test mode by entering the C0 test mode or turning off the power.

Key Operation

[>] (f2) ON : Starts the automatic adjustment.

Control Panel Display



A : The messages below are displayed.
"DR PG P AJ SRT" : Indicates that the polarity adjustment of a "C1D" drum PG is being executed.
"DR PG P AJ FIN" : Indicates that the automatic adjustment by "C1D" is completed normally.

The error message below is displayed when abnormality is detected during adjustment.
The adjustment is then interrupted.
"ERROR !!
DRUM MOTOR" : During PG polarity adjustment, A drum motor cannot be rotated at specified speed.

For countermeasures, refer to Section 3-6-8. Countermeasures for Error Messages.

B : 0D0D : Indicates the state in which "C1D" is selected.

C : No display appears.

D : No display appears.

Others : The polarity memory (NOVRAM $A8D0) of a drum PG is adjusted.
NTSC : 5AH or 5BH
PAL : 58H or 59H
Memorized by executing NOVRAM WRITE from the SP checker after adjustment is completed.

SV C1E DRUM VELOCITY ALIGNMENT

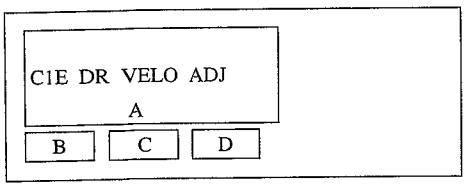
Outline

This command adjusts the speed loop of a drum motor.
It adjusts the correction value so that the error for the referçence speed is minimum.
The polarity of a drum PG must be adjusted during this adjustment (using a C1D command).
After adjustment is completed, NOVRAM WRITE is required from the SP checker.
The addresses to be changed are $A897 to $A89B of SP CPU.
The VTR does not operate ordinarily during test mode operation.
During operation completion, cancel the test mode by entering the C0 test mode or turning off the power.

Key Operation

[>] (f2) ON : Starts the automatic adjustment.

Control Panel Display



A : The messages below are displayed.
"DR VELO AJ SRT" : Indicates that the speed adjustment of a "C1E" drum motor is being executed.
"DR VELO AJ FIN" : Indicates that the automatic adjustment by "C1E" is completed normally.

The error message below is displayed when abnormality is detected during adjustment.
The adjustment is then interrupted.
"ERROR !!
DRUM MOTOR" : During speed adjustment, a drum motor cannot be rotated up to 95 % of specified speed or the error voltage after adjustment is too high.

For countermeasures, refer to Section 3-6-8. Countermeasures, for Error Messages.

B : 0E0E : Indicates the state in which "C1E" is selected.

C : No display appears.

D : No display appears.

Others : The correction value memory (NOVRAM $A897 to $A89B) of a drum motor speed is adjusted.
Memorized by executing NOVRAM WRITE from the SP checker after adjustment is completed.

SV C28 S-TENSION OFFSET ALIGNMENT

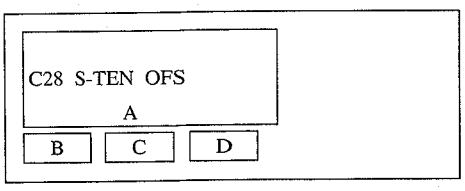
Outline

This command adjusts the offset voltage of a supply tension amplifier.
It can adjust the offset voltage while confirming the tension measurement value.
A supply tension adjustment tool is required to perform this adjustment.
After adjustment is completed, NOVRAM WRITE is required from the SP checker.
The address to be changed is $$A890 of SP CPU.
The VTR does not operate ordinarily during test mode operation.
During operation completion, cancel the test mode by entering the C0 test mode or turning off the power.

Key Operation

[<]+[ ] (f0) ON : The reference value (8000H) is set when this key is pressed for more than one second.
[<] (f1) ON : The offset value decreases 10H at a time.
[>] (f2) ON : The offset value increases 10H at a time.
[>]+[ ] (f3) ON : The reference value (8000H) is set while this key is pressed.

Control Panel Display



A : No display appears.

B : XXXX : Displays the supply tension offset value (NOVRAM $$A890).
Memorized by executing NOVRAM WRITE from the SP checker after adjustment is completed.

C : --XX : Displays the supply tension data.
DVR-20 : Corresponds to 00H when an "S TEN" signal (at TP39) on the SV-133 board is 0 V.
Corresponds to FFH when it is 5 V.
DVR-28 : Corresponds to 00H when an "S TEN" signal (at TP39) on the SSP-07 board is 0 V.
Corresponds to FFH when it is 5 V.

D : No display appears.

Specification

For 55 g, the supply tension data must be 54 ± 1H.
For 0 g, the supply tension data must be 0F ± 1H.

SV C29 S-TENSION GAIN ALIGNMENT

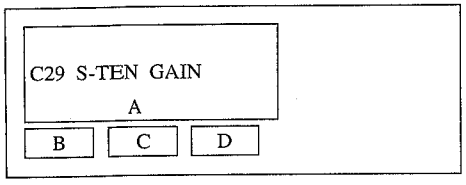
Outline

This command adjusts the gain of a supply tension amplifier.
It can adjust the amplifier gain while confirming the tension measurement value.
A supply tension adjustment tool is required to perform this adjustment.
After adjustment is completed, NOVRAM WRITE is required from the SP checker.
The address to be changed is $A892 of SP CPU.
The VTR does not operate ordinarily during test mode operation.
During operation completion, cancel the test mode by entering the C0 test mode or turning off the power.

Key Operation

[<] + [ ] (f0) ON : The reference value (80H) is set when this key is pressed for çmore than one second.
[<] (f1) ON : The offset value decreases 1H at a time.
[>] (f2) ON : The offset value increases 1H at a time.
[>] + [ ] (f3) ON : The reference value (80H) is set while this key is pressed.

Control Panel Display



A : No display appears.

B : --XX : Displays the supply tension gain value (NOVRAM $A892).
Memorized by executing NOVRAM WRITE from the SP checker after adjustment is completed.

C : --XX : Displays the supply tension data.
DVR-20 : Corresponds to 00H when an "S TEN" signal (at TP39) on the SV-133 board is 0 V.
Corresponds to FFH when it is 5 V.
DVR-28 : Corresponds to 00HG when an "S TEN" signal (at TP39) on the SSP-07 board is 0V.
Corresponds to FFH when it is 5 V.

D : No display appears.

Specification

For 55 g, the supply tension data must be 54 ± 1H.
For 0 g, the supply tension data must be 0F ± 1H.

SV C2A T-TENSION OFFSET ALIGNMENT

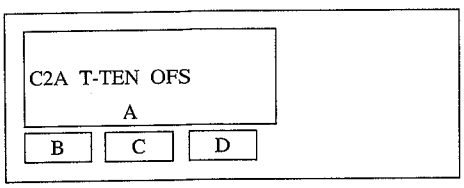
Outline

This command adjusts the offset voltage of a take-up tension amplifier.
It can adjust the offset voltage while confirming the tension measurement value.
A take-up tension adjustment tool is required to perform this adjustment.
After adjustment is completed, NOVRAM WRITE is required from the SP checker.
The address to be changed is $$A8B6 of SP CPU.
The VTR does not operate ordinarily during test mode operation.
During operation completion, cancel the test mode by entering the C0 test mode or turning off the power.

Key Operation

[<]+[ ] (f0) ON : The reference value (8000H) is set when this key is pressed for more than one second.
[<] (f1) ON : The offset value decreases 10H at a time.
[>] (f2) ON : The offset value increases 10H at a time.
[>]+[ ] (f3) ON : The reference value (8000H) is set while this key is pressed.

Control Panel Display



A : No display appears.

B : XXXX : Displays the take-up tension offset value (NOVRAM $$A8B6).
Memorized by executing NOVRAM WRITE from the SP checker after adjustment is completed.

C : --XX : Displays the take-up tension data.
DVR-20 : Corresponds to 00H when a "T TEN" signal (at TP40) on the SV-133 board is 0 V.
Corresponds to FFH when it is 5 V.
DVR-28 : Corresponds to 00H when a "T TEN" signal (at TP40) on the SSP-07 board is 0 V.
Corresponds to FFH when it is 5 V.

D : No display appears.

Specification

For 42 g, the take-up tension data must be 90 ± 1H.
For 0 g, the take-up tension data must be 0F ± 1H.

SV C2B T-TENSION GAIN ALIGNMENT

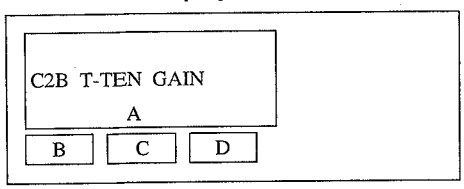
Outline

This command adjusts the gain of a take-up tension amplifier.
It can adjust the amplifier gain while confirming the tension measurement value.
A take-up tension adjustment tool is required to perform this adjustment.
After adjustment is completed, NOVRAM WRITE is required from the SP checker.
The address to be changed is $A8B8 of SP CPU.
The VTR does not operate ordinarily during test mode operation.
During operation completion, cancel the test mode by entering the C0 test mode or turning off the power.

Key Operation

[<] + [ ] (f0) ON : The reference value (80H) is set when this key is pressed for more than one second.
[<] (f1) ON : The offset value decreases 1H at a time.
[>] (f2) ON : The offset value increases 1H at a time.
[>] + [ ] (f3) ON : The reference value (80H) is set while this key is pressed.

Control Panel Display



A : No display appears.

B : --XX : Displays the take-up tension gain value (NOVRAM $A8B8).
Memorized by executing NOVRAM WRITE from the SP checker after adjustment is completed.

C : --XX : Displays the take-up tension data.
DVR-20 : Corresponds to 00H when a "T TEN" signal (at TP40) on the SV-133 board is 0 V.
Corresponds to FFH when it is 5 V.
DVR-28 : Corresponds to 00H when a "T TEN" signal (at TP40) on the SSP-07 board is 0 V.
Corresponds to FFH when it is 5 V.

D : No display appears.

Specification

For 42 g, the take-up tension data must be 90 ± 1H.
For 0 g, the tape-up tension data must be OF ± 1H.

SV D11 AUTOMATIC SERVO DIAGNOSTICS

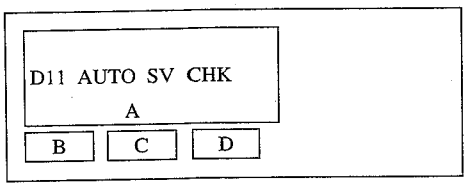
Outline

This command performs the self diagnosis of a servo system.
It continuously performs the twenty one self diagnoses of "D12" to "D27".
If some abnormality exists in the servo system, the defective point can be restricted by executing this command.
The VTR does not operate ordinarily during test mode operation.
During operation completion, cancel the test mode by entering the D0 test mode or turning off the power.

Key Operation

[>] (f2) ON : Starts the self diagnosis.

Control Panel Display



A : The messages below are displayed.

"XXXXXXXXXXX SRT" : Displays the self-diagnosis command in execution.

"AUTO SV CHK FIN" : Indicates that the self diagnosis by "D11" is completed.

"ERROR !!
XXXXXXXXXX" : Indicates that abnormality occurred.
For more details, refer to each item.

B : Refer to each item.

C : Refer to each item.

D : Refer to each item.

SV D12 CAPSTAN FG OFFSET DIAGNOSTICS

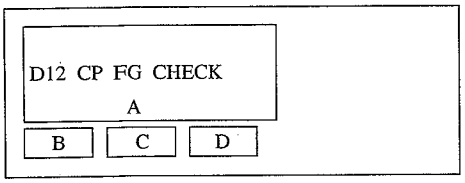
Outline

This command inspects the capstan FG.
It confirms the duty ratio of capstan FG A and FG B output pulses.
The addresses of NOVRAM data to be confirmed are $$A880 and $$A882.
The VTR does not operate ordinarily during test mode operation.
During operation completion, cancel the test mode by entering the D0 test mode or turning off the power.

Key Operation

[>] (f2) ON : Starts the self diagnosis.

Control Panel Display



A : The messages below are displayed.
"CP FG CHCK SRT" : Indicates that the self diagnosis of a "D12" capstan FG is being executed.
"CP FG CHCK FIN" : Indicates that the self diagnosis by "D12" is completed normally.

The error message below is displayed when abnormality is detected.

"ERROR !!
CAPSTAN FG" : No capstan FG can be detected or the duty ratio is abnormal.

For countermeasures, refer to Section 3-6-8. Countermeasures for Error Messages.

B : 0202 : Indicates the state in which "D12" is selected.

C : XXXX : Indicates the speed of a capstan FG A pulse.
NTSC : Number of FG A waves that are detected for 16.6 ms
PAL : Number of FG A waves that are detected for 20.0 ms

D : XXXX : Indicates the speed of a capstan FG B pulse.
NTSC : Number of FG B waves that are detected for 16.6 ms
PAL : Number of FG B waves that are detected for 20.0 ms

SV D13 T-REEL FG OFFSET DIAGNOSTICS

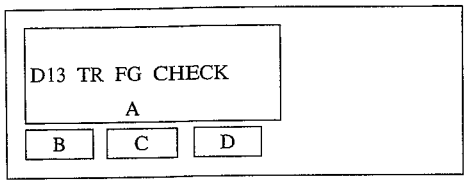
Outline

This command inspects the take-up reel FG.
It confirms the duty ratio of take-up reel FG A and FG B output pulses.
The addresses of NOVRAM data to be confirmed are $$A888 and $$A88A.
The VTR does not operate ordinarily during test mode operation.
During operation completion, cancel the test mode by entering the D0 test mode or turning off the power.

Key Operation

[>] (f2) ON : Starts the self diagnosis.

Control Panel Display



A : The messages below are displayed.
"TR FG CHCK SRT" : Indicates that the self diagnosis of a "D13" take-up reel FG is being executed.
"TR FG CHCK FIN" : Indicate that the self diagnosis by "D13" is completed normally.

The error message below is displayed when abnormality is detected.
"ERROR !!
T-REEL FG" : No take-up reel FG can be detected or the duty ratio is abnormal.

For countermeasures, refer to Section 3-6-8. Countermeasures for Error Messages.

B : 0303 : Indicates the state in which "D13" is selected.

C : XXXX : Indicates the speed of a take-up reel FG A pulse.
NTSC : Number of FG A waves that are detected for 16.6 ms
PAL : Number of FG A waves that are detected for 20.0 ms

D : XXXX : Indicates the speed of a take-up reel FG B pulse.
NTSC : Number of FG B waves that are detected for 16.6 ms
PAL : Number of FG B waves that are detected for 20.0 ms

SV D14 S-REEL FG OFFSET DIAGNOSTICS

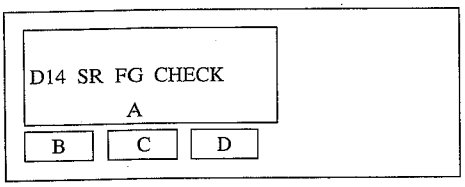
Outline

This command inspects the supply reel FG.
It confirms the duty ratio of supply reel FG A and FG B pulses.
The addresses of NOVRAM data to be confirmed are $$A884 and $$A886.
The VTR does not operate ordinarily during test mode operation.
During operation completion, cancel the test mode by entering the D0 test mode or turning off the power.

Key Operation

[>] (f2) ON : Starts the self diagnosis.

Control Panel Display



A : The messages below are displayed.
"SR FG CHCK SRT" : Indicates that the self diagnosis of a "D14" supply reel FG is being executed.
"SR FG CHCK FIN" : Indicates that the self diagnosis by "D14" is completed normally.

The error message below is displayed when abnormality is detected.
"ERROR !!
S-REEL FG" : No supply reel FG can be detected or the duty ratio is abnormal.

For countermeasures, refer to Section 3-6-8. Countermeasures for Error Messages.

B : 0404 : Indicates the state in which "D14" is selected.

C : XXXX : Indicates the speed of a supply reel FG A pulse.
NTSC : Number of FG A waves that are detected for 16.6 ms
PAL : Number of FG A waves that are detected for 20.0 ms

D : XXXX : Indicates the speed of a supply reel FG B pulse.
NTSC : Number of FG B waves that are detected for 16.6 ms
PAL : Number of FG B waves that are detected for 20.0 ms

SV D15 TAPE END SENSOR GAIN DIAGNOSTIC

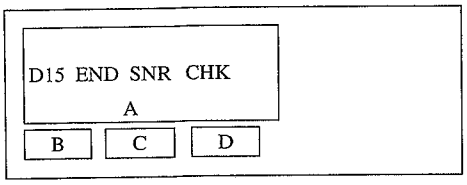
Outline

This command inspects the tape end sensor.
It confirms that the output voltage of the tape end sensor is 2.4 V.
The address of NOVRAM data to be confirmed is $A89E.
The VTR does not operate ordinarily during test mode operation.
During operation completion, cancel the test mode by entering the D0 test mode or turning off the power.

Key Operation

[>] (f2) ON : Starts the self diagnosis.

Control Panel Display



A : The messages below are displayed.
"END SIR CK SRT" : Indicates that the self diagnosis of a "D15" end sensor is being executed.
"END SNR CK FIN" : Indicates that the self diagnosis by "D15" is completed normally.

The error message below is displayed when abnormality is detected.
"ERROR !!
END SENSOR" : The output of an end sensor is abnormal.

For countermeasures, refer to Section 3-6-8. Countermeasures for Error Messages.

B : 0505 : Indicates the state in which "D15" is selected.

C : --XX : Indicates the output value of an end sensor. 0 to 5 V are represented as 00H to FFH. 2.4 V is 7AH.

D : No display appears.

SV D16 TAPE TOP SENSOR GAIN DIAGNOSTICS

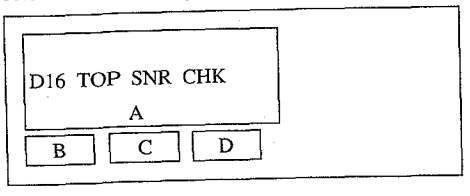
Outline

This command inspects the tape top sensor.
It confirms the output of the tape top sensor.
The address of NOVRAM data to be confirmed is $A89C.
The VTR does not operate ordinarily during test mode operation.
During operation completion, cancel the test mode by entering the D0 test mode or turning off the power.

Key Operation

[>] (f2) ON : Starts the self diagnosis.

Control Panel Display



A : The messages below are displayed.
"TOP SNR CK SRT" : Indicates that the self diagnosis of a "D16" top sensor is being executed.
"TOP SNR CK FIN" : Indicates that the self diagnosis by "D16" is completed normally.

The error message below is displayed when abnormality is detected.
"ERROR !!
TOP SENSOR" : The output of a top sensor is abnormal.

For countermeasures, refer to Section 3-6-8. Countermeasures for Error Messages.

B : 0606 : Indicates the state in which "D16" is selected.

C : --XX : Indicates the output value of a top sensor. 0 to 5 V are represented as 00H to FFH. 2.4 V is 7AH.

D : No display appears.

SV D17 TAPE CENTER (SAG) SENSOR GAIN DIAGNOSTIC

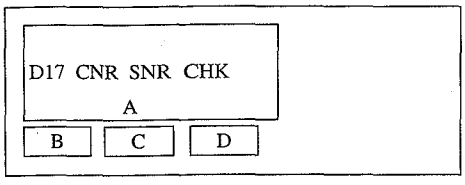
Outline

This command inspects the tape center (sag) sensor.
It confirms the output of the tape center sensor.
The address of NOVRAM data to be confirmed is $A89D.
The VTR does not operate ordinarily during test mode operation.
During operation completion, cancel the test mode by entering the D0 test mode or turning off the power.

Key Operation

[>] (f2) ON : Starts the self diagnosis.

Control Panel Display



A : The messages below are displayed.
"CNR SNR CK SRT" : Indicates that the self diagnosis of a "D17" center sensor is being executed.
"CNR SNR CK FIN" : Indicates that the self diagnosis by "D17" is completed normally.

The error message below is displayed when abnormality is detected.

"ERROR !!
CENTER SENSOR" : The output of a center sensor is abnormal.

For countermeasures, refer to Section 3-6-8. Countermeasures for Error Messages.

B : 0707 : Indicates the state in which "D17" is selected.

C : --XX : Indicates the output value of a center sensor. 0 to 5 V are represented as 00H to FFH. 2.4 V is 7AH.

D : No display appears.

SV D18 T-REEL MOTOR TORQUE DIAGNOSTICS

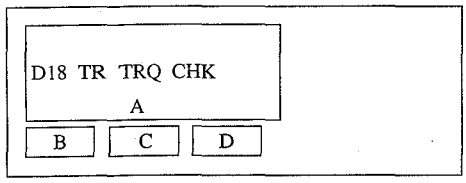
Outline

This command inspects the output torque of a take-up reel motor.
It measures the torque constant of the take-up reel motor and confirms whether the correction value is correct.
The address of NOVRAM data to be confirmed is $A88F.
The VTR does not operate ordinarily during test mode operation.
During operation completion, cancel the test mode by entering the D0 test mode or turning off the power.

Key Operation

[>] (f2) ON : Starts the self diagnosis.

Control Panel Display



A : The messages below are displayed.
"TR TRQ CHK SRT" : Indicates that the self diagnosis of a "D18" take-up reel torque is being executed.
"TR TRQ CHK FIN" : Indicates that the self diagnosis by "D18" is completed normally.

The error message below is displayed when abnormality is detected.
"ERROR !!
T-REEL TORQUE": The measurement value is dispersed excessiveçly or the correction value is shifted.

For countermeasures, refer to Section 3-6-8. Countermeasures for Error Messages.

B : 0808 : Indicates the state in which "C18" is selected.

C : --XX : Indicates the correction value (NOVRAM $A88F) of a settake-up reel torque.
-25 % to + 25 % are represented as 00H to FFH.

D : --XX : Indicates the correction value of a measured take-up reel torque.
-25 % to + 25 % are represented as 00H to FFH.
The reference value is 80H.

SV D19 S-REEL MOTOR TORQUE DIAGNOSTICS

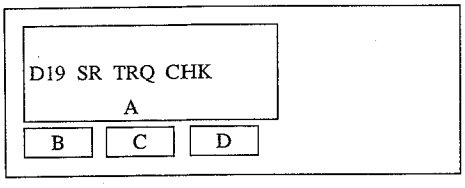
Outline

This command inspects the output torque of a supply reel motor.
It measures the torque constant of the supply reel motor and confirms whether the correction value is correct.
The address of NOVRAM data to be confirmed is $A88E.
The VTR does not operate ordinarily during test mode operation.
During operation completion, cancel the test mode by entering the D0 test mode or turning off the power.

Key Operation

[>] (f2) ON : Starts the self-diagnosis.

Control Panel Display



A : The messages below are displayed.
"SR TRQ CHK SRT" : Indicates that the self diagnosis of a "D19" supply reel torque is being executed.
"SR TRQ CHK FIN" : Indicates that the self diagnosis by "D19" is completed normally.

The error message below is displayed when abnormality is detected.
"ERROR !!
S-REEL TORQUE : The measurement value disperses excessively or the correction value is shifted.

For countermeasures, refer to Section 3-6-8. Countermeasures for Error Messages.

B : 0909 : Indicates the state in which "C19" is selected.

C : --XX : Indicates the correction value (NOVRAM $A88E) of a set supply reel torque.
-25 % to + 25 % are represented as 00H to FFH.

D : --XX : Indicates the correction value of a measured supply reel torque.
-25 % to + 25 % are represented as 00H to FFH.
The reference value is 80H.

SV D1A CAPSTAN MOTOR DIAGNOSTICS

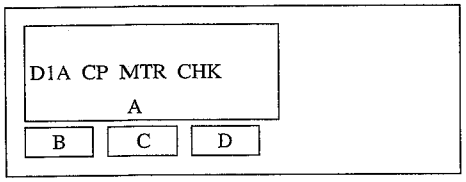
Outline

This command inspects the speed when the capstan motor is driven by a 3.5 V voltage.
The VTR does not operate ordinarily during test mode operation.
During operation completion, cancel the test mode by entering the D0 test mode or turning off the power.

Key Operation

[>] (f2) ON : Starts the self diagnosis.

Control Panel Display



A : The messages below are displayed.
"CP MTR CHK SRT" : Indicates that the self diagnosis of a "D1A" capstan motor is being executed.
"CP MTR CHK FIN" : Indicates that the self diagnosis by "D1A" is completed normally.
It is confirmed that the speed three seconds from when the capstan motor is driven by a 3.5 V voltage is 1.7 to 2.7 times as high as the REC speed.

The error message below is displayed when abnormality is detected.
"ERROR !!
CAPSTAN MOTOR": The capstan motor is driven by a 3.5 V voltage, but its speed is abnormal.

For countermeasures, refer to Section 3-6-8. Countermeasures for Error Messages.

B : 0A0A : Indicates the state in which "D1A" is selected.

C : XXXX : Indicates the capstan speed.
The REC speed corresponds to 0FA0H (= 4000)

D : No display appears.

SV D1B CAPSTAN NORMAL VELOCITY DIAGNOSTICS

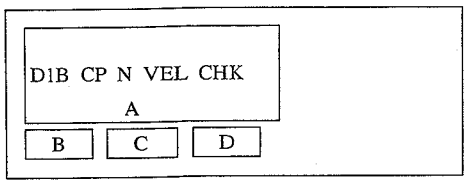
Outline

This command rotates the capstan motor at REC speed and confirms that the reference value is adjusted so that the output from a speed error measuring instrument is minimum.
The address of NOVRAM data to be confirmed is $$A8C2.
The VTR does not operate ordinarily during test mode operation.
During operation completion, cancel the test mode by entering the D0 test mode or turning off the power.

Key Operation

[>] (f2) ON : Starts the self diagnosis.

Control Panel Display



A : The messages below are displayed.
"CP NVEL CK SRT" : Indicates that the self diagnosis of a "D1B" capstan REC speed is being executed.
"CP NVEL CK FIN" : Indicates that the self diagnosis by "D1B" is completed normally.

The error messages below are displayed when abnormality is detected.
"ERROR !!
CAPSTAN MOTOR": The capstan motor cannot be rotated at REC speed.
"ERROR !!
CP NVL UNSTBL" : The driving voltage of a capstan motor fluctuates excessively.
"ERROR !!
CP NORM VELO" : The output form a speed error measuring instrument is abnormal.

For countermeasures, refer to Section 3-6-8. Countermeasures for Error Messages.

B : 0B0B : Indicates the state in which "D1B" is selected.

C : XXXX : Indicates the capstan speed.
The REC speed corresponds to 0FA0H (= 4000).

D : No display appears.

SV D1C CAPSTAN F. FORMAT VELOCITY DIAGNOSTICS

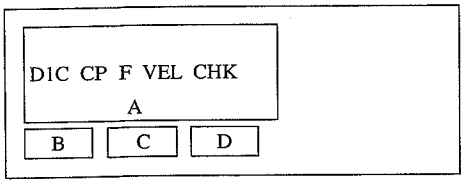
Outline

This command rotates the capstan motor at fast format speed and confirms that the reference value is adjusted so that the output from a speed error measuring instrument is minimum.
The address of NOVRAM data to be confirmed is $$A8C4.
The VTR does not operate ordinarily during test mode operation.
During operation completion, cancel the test mode by entering the D0 test mode or turning off the power.

Key Operation

[>] (f2) ON : Starts the self diagnosis.

Control Panel Display



A : The messages below are displayed.
"CP FVEL CK SRT" : Indicates that the self diagnosis of a "D1C" capstan REC speed is being executed.
"CP FVEL CK FIN" : Indicates that the self diagnosis by "D1C" is completed normally.

The error messages below are displayed when abnormality is detected.
"ERROR !!
CAPSTAN MOTOR": The capstan motor cannot be rotated at fast format speed.
"ERROR !!
CP FVL UNSTBL" : The driving voltage of a capstan motor fluctuates excessively.
"ERROR !!
CP FFOR VELO" : The output from a speed error measuring instrument is abnormal.

For countermeasures, refer to Section 3-6-8. Countermeasures for Error Messages.

B : 0C0C : Indicates the state in which "D1C" is selected.

C : XXXX : Indicates the capstan speed.
The fast format speed corresponds to 2EE0H (= 12000).

D : No display appears.

SV D1D CAPSTAN FG GAIN DIAGNOSTICS

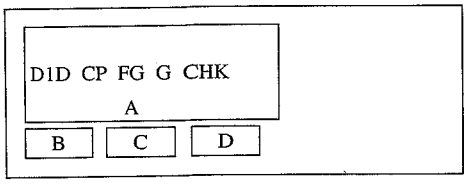
Outline

This command measures the amplitude of a capstan FG pulse and confirms that the internal gain constant is adjusted correctly.
The addresses of NOVRAM data to be confirmed are $A88C and $A88D.
The VTR does not operate ordinarily during test mode operation.
During operation completion, cancel the test mode by entering the D0 test mode or turning off the power.

Key Operation

[>] (f2) ON : Starts the self diagnosis.

Control Panel Display



A : The messages below are displayed.
"CP FG G CK SRT" : Indicates that the self diagnosis of a "D1D" capstan FG gain is being executed.
"CP FG G CK FIN" : Indicates that the self diagnosis by "D1D" is completed normally.

The error messages below are displayed when abnormality is detected.
"ERROR !!
CAPSTAN MOTOR": The capstan motor cannot be rotated at specified speed.
"ERROR !!
CAP FG LEVEL" : The amplitude of a capstan motor FG pulse.

For countermeasures, refer to Section 3-6-8. Countermeasures for Error Messages.

B : 0D0D : Indicates the state in which "D1D" is selected.

C : XXXX : Indicates the capstan speed.
The REC speed corresponds to 0FA0H (= 4000).

D : No display appears.

SV D1E T-REEL BRAKE FORCE DIAGNOSTICS

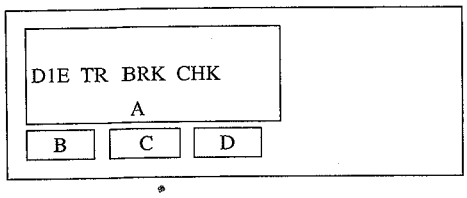
Outline

This command inspects the take-up reel brake force.
It measures the brake force of a take-up reel motor and confirms that the brake force satisfies the specification.
The VTR does not operate ordinarily during test mode operation.
During operation completion, cancel the test mode by entering the D0 test mode or turning off the power.

Key Operation

[>] (f2) ON : Starts the self diagnosis.

Control Panel Display



A : The messages below are displayed.
"TR BRK CHK SRT" : Indicates that the self diagnosis of a "D1E" take-up reel brake force is being executed.
"TR BRK CHK FIN" : Indicates that the self diagnosis by "D1E" is completed normally.

The error message below is displayed when abnormality is detected.
"ERROR !!
T-REEL BRAKE" : The brake force is abnormal.

For countermeasures, refer to Section 3-6-8. Countermeasures for Error Messages.

B : 0E0E : Indicates the state in which "D1E" is selected.

C : XXXX : Indicates the measurement value of a brake force in the clockwise rotation. The unit is gcm in decimals.

D : XXXX : Indicates the measurement value of a brake force in the counterclockwise rotation. The unit is gcm in decimals.

Specification :
This self diagnosis must be completed normally.
DVR-20 : The brake force in the clockwise rotation is 2.94 to 8.83 N.mm (30 to 90 gcm).
The brake force in the counterclockwise rotation is 19.61 to 68.64 N.mm (200 to 700 gcm).
DVR-28 : The brake force in the clockwise rotation is 8.83 to 15.69 N.mm (90 to 160 gcm).
The brake force in the counterclockwise rotation is 54.91 to 71.58 N.mm (560 to 730 gcm).

SV D1F S-REEL BRAKE FORCE DIAGNOSTICS

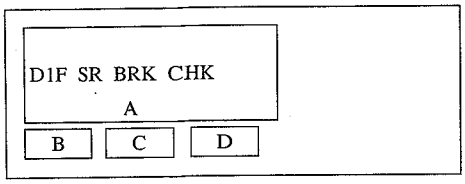
Outline

This command inspects the supply reel brake force.
It measures the brake force of a supply reel motor and confirms that the brake force satisfies the specification.
The VTR does not operate ordinarily during test mode operation.
During operation completion, cancel the test mode by entering the D0 test mode or turning off the power.

Key Operation

[>] (f2) ON :

Control Panel Display



A : The messages below are displayed.
"SR BRK CHK SRT" : Indicates that the self diagnosis of a "D1F" supply reel brake force is being executed.
"SR BRK CHK FIN" : Indicates that the self diagnosis by "D1F" is completed normally.

The error message below is displayed when abnormality is detected.
"ERROR !!
S-REEL BRAKE" : The brake force is abnormal.

For countermeasures, refer to Section 3-6-8. Countermeasures for Error Messages.

B : 0F0F : Indicates the state in which "D1F" is selected.

C : XXXX : Indicates the measurement value of a brake force in the clockwise rotation. The unit is gcm in decimals.

D: XXXX : Indicates the measurement value of a brake force in the counterclockwise rotation. The unit is gcm in decimals.

Specification :
This self diagnosis must be completed normally.
DVR-20 : The brake force in the counterclockwise rotation is 2.94 to 8.83 N.mm (30 to 90 gcm).
The brake force in the clockwise rotation is 19.61 to 68.64 N.mm (200 to 700 gcm).
DVR-28 : The brake force in the counterclockwise rotation is 8.83 to 15.69 N.mm (90 to 160 gcm).
The brake force in the clockwise rotation is 54.91 to 71.58 N.mm (560 to 730 gcm).

SV D21 T-REEL TENSION SENSOR DIAGNOSTICS

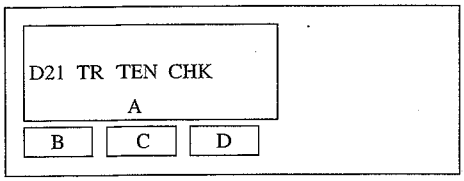
Outline

This command inspects the take-up reel tension sensor.
It electrically confirms that offset and gain adjustments satisfy the specification on the assumption that the spring has been adjusted.
The VTR does not operate ordinarily during test mode operation.
During operation completion, cancel the test mode by entering the D0 test mode or turning off the power.

Key Operation

[>] (f2) ON : Starts the self diagnosis.

Control Panel Display



A : The messages below are displayed.
"TR TEN CHK SRT" : Indicates that the self diagnosis of a "D21" take-up reel tension is being executed.
"TR TEN CHK FIN" : Indicates that the self diagnosis by "D21" is completed normally.

The error message below is displayed when abnormality is detected.
"ERROR !!
T-REEL TENSION" : The tension data is abnormal.

For countermeasures, refer to Section 3-6-8. Countermeasures for Error Messages.

B : 1010 : Indicates the state in which "D21" is selected.

C : --XX : Displays the take-up tension data.
DVR-20 : Corresponds to 00H when a "T TEN" signal (at TP40) on the SV-133 board is 0 V.
Corresponds to FFH when it is 5 V.
DVR-28 : Corresponds to 00H when a "T TEN" signal (at TP40) on the SSP-07 board is 0 V.
Corresponds to FFH when it is 5 V.
Indicates the tension data when 0 g and 42 g inspections are performed.

D : No display appears.

SV D22 S-REEL TENSION SENSOR DIAGNOSTICS

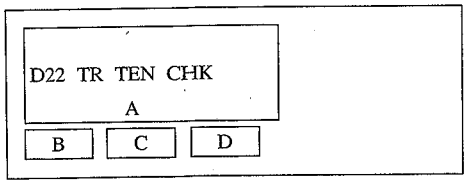
Outline

This command inspects the supply reel tension sensor.
It electrically confirms that offset and gain adjustments satisfy the specification on the assumption that the spring has been adjusted.
The VTR does not operate ordinarily during test mode operation.
During operation completion, cancel the test mode by entering the D0 test mode or turning off the power.

Key Operation

[>] (f2) ON : Starts the self diagnosis.

Control Panel Display



A : The messages below are displayed.
"SR TEN CHK SRT" : Indicates that the self diagnosis of a "D22" supply reel tension is being executed.
"SR TEN CHK FIN" : Indicates that the self diagnosis by "D22" is completed normally.

The error message below is displayed when abnormality is detected.
"ERROR !!
S-REEL TENSION" : The tension data is abnormal.

For countermeasures, refer to Section 3-6-8. Countermeasures for Error Messages.

B : 1111 : Indicates the state in which "D22" is selected.

C : --XX : Displays the supply tension data.
DVR-20 : Corresponds to 00H when an "S TEN" signal (at TP39) on the SV-133 board is 0 V.
Corresponds to FFH when it is 5 V.
DVR-28 : Corresponds to 00H when an "S TEN" signal (at TP39) on the SSP-07 board is 0 V.
Corresponds to FFH when it is 5 V.
Indicates the tension data when 0 g and 55 g inspections çare performed.

D : No display appears.

SV D23 DRUM LOCK UP DIAGNOSTICS

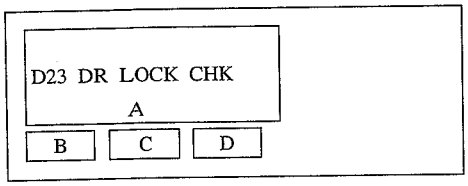
Outline

This command inspects the rise time (lock-up time) and fall time (stop time) of a drum motor.
The rise time and fall time are completed in approximately 20 seconds.
The VTR does not operate ordinarily during test mode operation.
During operation completion, cancel the test mode by entering the D0 test mode or turning off the power.

Key Operation

[>] (f2) ON : Starts the self diagnosis.

Control Panel Display



A : The messages below are displayed.
"DR LOCK CK SRT" : Indicates that the self diagnosis of a "D24" drum lock time is being executed.
"DR LOCK CK FIN" : Indicates that the self diagnosis by "D24" is completed normally.

The error message below is displayed when abnormality is detected.
"ERROR !!
DRUM LOCK TIME" : The drum motor cannot be rotated at specified speed, or the drum motor's rise time and fall time are abnormal.

For countermeasures, refer to Section 3-6-8. Countermeasures for Error Messages.

B : XXXX : Indicates the time (number of fields) from when the self diagnosis is initiated.
NTSC : One second 003CH PAL : One second 0032H

C : --XX : Indicates the drum mode flag.
01H : Drum stop 78H : Drum lock

D : --XX : Indicates the measured rise time (lock-up time).
NTSC : 4 seconds 78H PAL : 4 seconds 64H

XX-- : Indicates the measured fall time (stop time).
NTSC : 6 seconds B4H PAL : 6 seconds 96H

SV D24 DRUM PG POLARITY DIAGNOSTICS

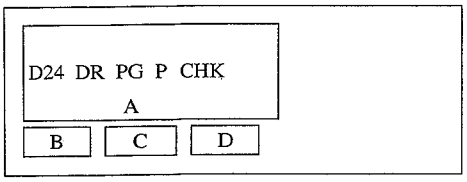
Outline

This command measures the FG polarity for a drum PG pulse and confirms that the polarity is adjusted correctly.
It starts the drum motor, measures the FG polarity, and displays the result compared with the adjusted data.
The address of NOVRAM data to be confirmed is $A8D0.
The VTR does not operate ordinarily during test mode operation.
During operation completion, cancel the test mode by entering the D0 test mode or turning off the power.

Key Operation

[>] (f2) ON : Starts the self diagnosis.

Control Panel Display



A : The messages below are displayed.
"DR PG P CK SRT" : Indicates that the self diagnosis of a "D24" drum PG polarity is being executed.
"DR PG P CK FIN" : Indicates that the self diagnosis by "D24" is completed normally.

The error message below is displayed when abnormality is detected.
"ERROR !!
DR PG POLARITY" : The drum motor cannot be rotated at the specified speed or the result obtained when the PG polarity is measured does not coincide with the adjusted data.

For countermeasures, refer to Section 3-6-8. Countermeasures for Error Messages.

B : XXXX : Indicates the time (number of fields) from when the self diagnosis is initiated.
NTSC : One second 003CH PAL : One second 0032H

C : --XX : Indicates the drum mode flag.
01H: Drum stop 78H: Drum lock

D : --XX : Indicates the adjustment value (NOVRAM $A8D0) of drum PG polarity.
NTSC : 5AH or 5BH PAL : 58H or 59H

SV D25 DRUM VELOCITY DIAGNOSTICS

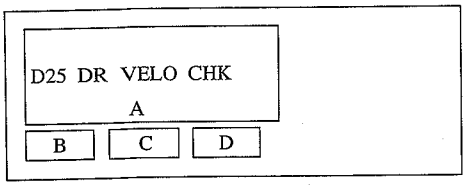
Outline

This command inspects the drum speed loop adjustment.
It starts the drum motor and confirms the error voltage.
The addresses of NOVRAM data to be confirmed are $A897 to $A89B.
The VTR does not operate ordinarily during test mode operation.
During operation completion, cancel the test mode by entering the D0 test mode or turning off the power.

Key Operation

[>] (f2) ON : Starts the self diagnosis.

Control Panel Display



A : The messages below are displayed.
"DR VELO CK SRT" : Indicates that the self diagnosis of a "D25" drum PG polarity is being executed.
"DR VELO CK FIN" : Indicates that the self diagnosis by "D25" is completed normally.

The error message below is displayed when abnormality is detected.
"ERROR !!
DRUM VELOCITY" : The drum motor cannot be rotated at the specified speed or the measured error voltage is abnormal.

For countermeasures, refer to Section 3-6-8. Countermeasures for Error Messages.

B : XXXX : Indicates the time (number of fields) from when the self diagnosis is initiated.
NTSC : One second 003CH PAL : One second 0032H

C : --XX : Indicates the drum mode flag.
01H : Drum stop 78H : Drum lock

D : XXXX : Indicates the maximum value of an error voltage.
2.5 V : 4000H

SV D26 DRUM PG JITTER DIAGNOSTICS

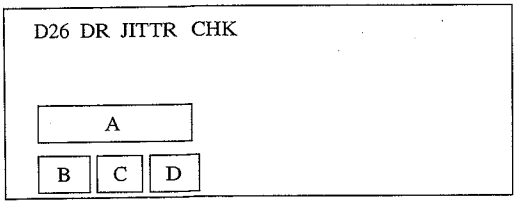
Outline

This command inspects the drum PG jitter.
It starts the drum motor and confirms the maximum value of the PG jitter.
The VTR does not operate ordinarily during test mode operation.
During operation completion, cancel the test mode by entering the D0 test mode or turning off the power.

Key Operation

[>] (f2) ON : Starts the self diagnosis.

Control Panel Display



A : The messages below are displayed.
"DR JITR CK SRT" : Indicates that the self diagnosis of a "D27" drum PG jitter is being executed.
"DR JITR CK FIN" : Indicates that the self diagnosis by "D27" is completed normally.

The error message below is displayed when abnormality is detected.
"ERROR !!
DRUM PG JITTER" : The drum motor cannot be rotated at the specified speed or the maximum value of a measured PG jitter is abnormal.

For countermeasures, refer to Section 3-6-8. Countermeasures for Error Messages.

B : XXXX : Indicates the time (number of fields) from when the self diagnosis is initiated.
NTSC : One second 003CH PAL : One second 0032H

C : --XX : Indicates the drum mode flag.
01H : Drum stop 78H : Drum lock

D : --XX : Indicates the maximum value of a measured PG jitter.
3 us : 0BH

SV D27 THREAD DIAGNOSTICS

Outline

This command checks the threading or unthreading operation and the TTP sensor.
The check consists of the steps below.

DVR-20 / 28

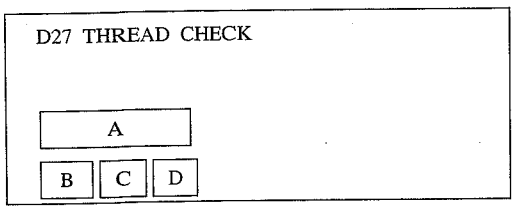
0.	UNTHREADING	: Moves the arm to the unthreading position and confirms that the operation is completed within five seconds.
1.	UNTHREAD HOLD CHECK	: Confirms that the arm properly stops in the unthreading position for two seconds.
2.	TTP SENSOR CHECK	: Confirms the sensitivity and shielding state of the sensor by changing the light-emitting amount of a TTP sensor to 0 %, 75 %, 100 %, or 180 %.
3.	THREADING	: Moves the arm to the threading position and confirms that the operation is completed within five seconds.
4.	THREAD HOLD CHECK	: Confirms that the arm properly stops in the threading position for two seconds.
5.	SENSOR CHECK	: Confirms the sensitivity and shielding state of the sensor by changing the light-emitting amount of a TTP sensor to 0 %, 75 %, 100 %, or 180 %.
6.	UNTHREADING	: Moves the arm to the unthreading position and confirms that the operation is completed within five seconds.
7.	UNTHREAD HOLD CHECK	: Confirms that the arm properly stops in the unthreading position for two seconds.

Each check is performed by the function key operation.
The operation in this test mode uses sensor information to turn on or off a motor and perform a power control in the same manner as for the ordinary operation.
This test mode must be put when the VTR is in the EJECT state and when the cassette compartment is in the UP position, with the pinch turned off.
The VTR does not operate ordinarily during test mode operation.
During operation completion, cancel the test mode by entering the D0 test mode or turning off the power.

Key Operation

[<] (f1) : The check is stopped.
[>] (f2) : The check is started.

Control Panel Display



A :

"THREAD CHK STR" : Indicates that a check is in execution.
"THREAD CHK FIN" : The check is completed normally.

"ERROR !!
THREAD MOTOR" : The threading or unthreading operation is not completed within the specified time or the thread hold or unthread hold operation is not performed properly.

For the error messages below, sensor shielding or transmission state may be defective.

"ERROR !!
CCM UP SENSOR" : (DVR-20) Cassette compartment up sensor
(DVR-28) Inner cassette compartment up sensor
Outer cassette compartment up sensor

"ERROR !!
CST IN SENSOR" : Cassette in sensor

"ERROR !!
CST SIZE SNR" : (DVR-20) Cassette size sensor
(DVR-28) Cassette size sensor M
Cassette size sensor L

"ERROR !!
CST DOWN SNR" : (DVR-20) Cassette compartment down sensor
(DVR-28) Inner cassette compartment down sensor
Outer cassette compartment down sensor

"ERROR !!
M SIDE SENSOR" : (DVR-20) Reel shift sensor (M)
(DVR-28) Reel shift sensor (S reel)

"ERROR !!
S SIDE SENSOR" : (DVR-20) Reel shift sensor (S)
(DVR-28) Reel shift sensor (T reel)

"ERROR !!
USR (CNR M) SNR" : (DVR-20) User center sensor (M cassette)
(DVR-28) Center sensor (M cassette)
Center sensor (L cassette)

"ERROR !!
USR (CNR S) SNR" : User center sensor (S cassette)

"ERROR !!
USR (S SIDE) SNR" : S-side user sensor

"ERROR !!
USR (T SIDE) SNR" : T-side user sensor

"ERROR !!
REC INH SENSOR" : Cassette cording sensor

"ERROR !!
CORD HOLE 1 SNR" : Cassette cording sensor 1

"ERROR !!
CORD HOLE 2 SNR" : Cassette cording sensor 2

"ERROR !!
CORD HOLE 3 SNR" : Cassette cording sensor 3

"ERROR !!
CORD HOLE 4 SNR" : Cassette cording sensor 4

For countermeasures, refer to Section 3-6-8. Countermeasures for Error Messages.

B : --XX : Displays the thread check step.

C : --XX : Displays the execution time of each check step.

D : Displays the threading position data.

--XX
└→ THREADING POSITION DATA

Specification

0EDH in the threading position
Unthread value = NOVRAM $A8A0

SV D28 CASSETTE COMPARTMENT DIAGNOSTICS

Outline

This command checks the cassette compartment down or up operation and the TTP sensor.
The check consists of the steps below.

DVR-20 / 28

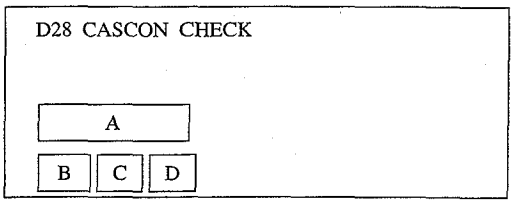
0.	CASSETTE COMPARTMENT UP	: Performs the up operation and confirms that the operation is completed within five seconds.
1.	UP HOLD CHECK	: Confirms that the cassette compartment stops in the up position for two seconds.
2.	TTP SENSOR CHECK	: Confirms the sensitivity and shielding state of the sensor by changing the light-emitting amount of a TTP sensor to 0 %, 75 %, 100 %, or 180 %.
3.	CASSETTE COMPARTMENT DOWN	: Performs the down operation and confirms that the operation is completed within five seconds.
4.	DOWN HOLD CHECK	: Confirms the sensitivity and shielding state of the sensor by changing the light-emitting amount of a TTP sensor to 0 %, 75 %, 100 %, or 180 %.
5.	TTP SENSOR CHECK	: Confirms the sensitivity and shielding state of the sensor by changing the light-emitting amount of a TTP sensor to 0 %, 75 %, 100 %, or 180 %.
6.	UP HOLD CHECK	: Confirms that the cassette compartment stops in the up position for two seconds.
7.	TTP SENSOR CHECK	: Confirms the sensitivity and shielding state of the sensor by changing the light-emitting amount of a TTP sensor to 0 %, 75 %, 100 %, or 180 %.

Each check is performed by the function key operation.
The operation in the D28 test mode uses sensor information to turn on or off a motor and perform a power control in the same manner as for the ordinary operation.
This test mode must be put when the VTR is in the EJECT state and when the threading arm is in the unthreading position, with no cassette in the compartment.
The VTR does not operate ordinarily during test mode operation.
During operation completion, cancel the test mode by entering the D0 test mode or turning off the power.

Key Operation

[<] (f1) : The check is stopped.
[>] (f2) : The check is started.

Control Panel Display



A:

"CASCON CHK STR" : Indicates that a check is in execution.
"CASCON CHK FIN" : The check is completed normally.

"ERROR !!
CASSECON MOTOR" : The cassette compartment up or down operation is not completed within the specified time, or the cassette compartment up or down hold operation is not performed properly.

For the error messages below, sensor shielding or transmission state may be defective.

"ERROR !!
CCM UP SENSOR" : (DVR-20) Cassette compartment up sensor
(DVR-28) Inner cassette compartment up sensor
Outer cassette compartment up sensor

"ERROR !!
CST IN SENSOR" : Cassette in sensor

"ERROR !!
CST SIZE SNR" : (DVR-20) Cassette compartment size sensor
(DVR-28) Cassette size sensor M
Cassette size sensor L

"ERROR !!
CST DOWN SNR" : (DVR-20) Cassette compartment down sensor
(DVR-28) Inner cassette compartment down sensor
Outer cassette compartment down sensor

"ERROR !!
M SIDE SENSOR" : (DVR-20) Reel shift sensor (M)
(DVR-28) Reel shift sensor (S reel)

"ERROR !!
S SIDE SENSOR" : (DVR-20) Reel shift sensor (S)
(DVR-28) Reel shift sensor (T reel)

"ERROR !!
USR (CNR M) SNR" : (DVR-20) User center sensor (M cassette)
(DVR-28) Center sensor (M cassette)
Center sensor (L cassette)

"ERROR !!
USR (CNR S) SNR" : User center sensor (S cassette)

"ERROR !!
USR (S SIDE) SNR" : S-side user sensor

"ERROR !!
USR (T SIDE) SNR" : T-side user sensor

"ERROR !!
REC INH SENSOR" : Cassette cording sensor

"ERROR !!
CORD HOLE 1 SNR" : Cassette cording sensor 1

"ERROR !!
CORD HOLE 2 SNR" : Cassette cording sensor 2

"ERROR !!
CORD HOLE 3 SNR" : Cassette cording sensor 3

"ERROR !!
CORD HOLE 4 SNR" : Cassette cording sensor 4

For countermeasures, refer to Section 3-6-8. Countermeasures for Error Messages.

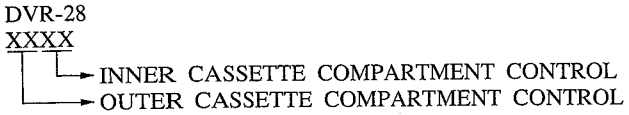
B : --XX : Displays the cassette compartment check step.

C : --XX : Displays the execution time of each check step.

D : Displays the control value of a cassette compartment.

DVR-20

DVR-28



SV D29 REEL SHIFT DIAGNOSTICS

Outline

This command checks the reel shift operation and the TTP sensor.
The check consists of the steps below.

DVR-20

0. REEL SHIFT M	:	Performs the reel shift M operation and confirms that the operation is completed within three seconds.
1. M-POSITION HOLD CHECK	:	Confirms that the reel stops in the M position for two seconds.
2. TTP SENSOR CHECK	:	Confirms the sensitivity and shielding state of the sensor by changing the light-emitting amount of a TTP sensor to 0 %, 75 %, 100 %, or 180 %.
3. REEL SHIFT S	:	Performs the reel shift S operation and confirms that the operation is completed within three seconds.
4. S-POSITION HOLD CHECK	:	Confirms that the reel stops in the S position for two seconds.
5. TTP SENSOR CHECK	:	Confirms the sensitivity and shielding state of the sensor by changing the light-emitting amount of a TTP sensor to 0 %, 75 %, 100 %, or 180 %.
6. REEL SHIFT M	:	Performs the reel shift M operation and confirms that the operation is completed within three seconds.
7. M-POSITION HOLD CHECK	:	Confirms that the reel stops in the M position for two seconds.

DVR-28

0. REEL SHIFT S	:	Performs the reel shift S operation and confirms that the operation is completed within three seconds.
1. S-POSITION HOLD CHECK	:	Confirms that the reel stops in the S position for two seconds.
2. TTP SENSOR CHECK	:	Confirms the sensitivity and shielding state of the sensor by changing the light-emitting amount of a TTP sensor to 0 %, 75 %, 100 %, or 180 %.
3. REEL SHIFT M	:	Performs the reel shift M operation and confirms that the operation is completed within three seconds.
4. M-POSITION HOLD CHECK	:	Confirms that the reel stops in the M position for two seconds.
5. TTP SENSOR CHECK	:	Confirms the sensitivity and shielding state of the sensor by changing the light-emitting amount of a TTP sensor to 0 %, 75 %, 100 %, or 180 %.
6. REEL SHIFT L	:	Performs the reel shift L operation and confirms that the operation is completed within three seconds.
7. L-POSITION HOLD CHECK	:	Confirms that the reel stops in the L position for two seconds.
8. TTP SENSOR CHECK	:	Confirms the sensitivity and shielding state of the sensor by changing the light-emitting amount of a TTP sensor to 0 %, 75 %, 100 %, or 180 %.
9. REEL SHIFT M		
10. M-POSITION HOLD CHECK		
11. TTP SENSOR CHECK		
12. REEL SHIFT S		
13. S-POSITION HOLD CHECK		
14. TTP SENSOR CHECK		
15. REEL SHIFT L		
16. L-POSITION HOLD CHECK		
17. TTP SENSOR CHECK		
18. REEL SHIFT S		
19. S-POSITION HOLD CHECK		
20. TTP SENSOR CHECK		

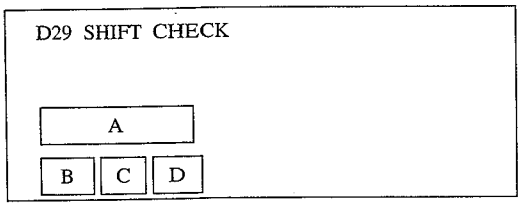
Each check is performed by the function key operation.
The operation in the D29 test mode uses sensor information to turn on or off a motor and perform a power control in the same manner as for the ordinary operation.
This test mode must be put when the VTR is in the EJECT state and when the cassette compartment is in the up position.
The VTR does not operate ordinarily during test mode operation.
During operation completion, cancel the test mode by entering the D0 test mode or turning off the power.

Key Operation

[<] (f1) : The check is stopped.

[>] (f2) : The check is started.

Control Panel Display



A :

"SHIFT CHCK STR" : Indicates that a check is in execution.

"SHIFT CHCK FIN" : The check is completed normally.

"ERROR !!
SHIFT MOTOR" : The reel shift operation is not completed within the specified time or the reel shift hold operation is not performed properly.

For the error messages below, sensor shielding or transmission state may be defective.

"ERROR !!
CCM UP SENSOR" : (DVR-20) Cassette compartment up sensor
(DVR-28) Inner cassette compartment up sensor
Outer cassette compartment up sensor

"ERROR !!
CST IN SENSOR" : Cassette in sensor

"ERROR !!
CST SIZE SNR" : (DVR-20) Cassette compartment size sensor
(DVR-28) Cassette size sensor M
Cassette size sensor L

"ERROR !!
CST DOWN SNR" : (DVR-20) Cassette compartment down sensor
(DVR-28) Inner cassette compartment down sensor
Outer cassette compartment down sensor

"ERROR !!
M SIDE SENSOR" : (DVR-20) Reel shift sensor (M)
(DVR-28) Reel shift sensor (S reel)

"ERROR !!
S SIDE SENSOR" : (DVR-20) Reel shift sensor (S)
(DVR-28) Reel shift sensor (T reel)

"ERROR !!
USR (CNR M) SNR" : (DVR-20) User center sensor (M cassette)
(DVR-28) Center sensor (M cassette)
Center sensor (L cassette)

"ERROR !!
USR (CNR S) SNR" : User center sensor (S cassette)

"ERROR !!
USR (S SIDE) SNR" : S-side user sensor

"ERROR !!
USR (T SIDE) SNR" : T-side user sensor

"ERROR !!
REC INH SENSOR" : Cassette cording sensor

"ERROR !!
CORD HOLE 1 SNR" : Cassette cording sensor 1

"ERROR !!
CORD HOLE 2 SNR" : Cassette cording sensor 2

"ERROR !!
CORD HOLE 3 SNR" : Cassette cording sensor 3

"ERROR !!
CORD HOLE 4 SNR" : Cassette cording sensor 4

For countermeasures, refer to Section 3-6-8. Countermeasures for Error Messages.

B : --XX : Displays the reel shift check step.

C : --XX : Displays the execution time of each check step.

D : Displays the reel shift position data of the DVR-28 board.

- - XX
DVR-28 REEL SHIFT POSITION DATA
(L-CASSETTE POSITION DATA > S-CASSETTE POSITION DATA)

Specifications

1. 6FH +- 01H = A is obtained when the cassette compartment moves from L-cassette position to M-cassette position and when the take-up reel spring contracts. Value A - 30H = NOVRAM $A8AD.
2. Value A +- 03H = B is obtained when the cassette compartment moves from S-cassette position to M-cassette position and when the supply reel spring contracts. Value B + 30H = NOVRAM $A8AE.
3. The value when the cassette compartment moves to the S-cassette position and when the take-up reel spring contracts is NOVRAM $A8AC.
4. The value when the cassette compartment moves to the L-cassette position and when the supply reel spring contracts is NOVRAM $A8AF.

SP D2A OTHER SENSORS DIAGNOSTICS

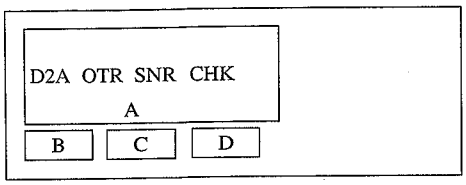
Outline

This command checks the TTP sensor.
The check is performed by the function key operation.
This command confirms the sensitivity and shielding state of the sensor by changing the light-emitting amount of a TTP sensor to 0 %, 75 %, 100 %, or 180 %.
The VTR does not operate ordinarily during test mode operation.
During operation completion, cancel the test mode by entering the D0 test mode or turning off the power.

Key Operation

[<] (f1) : The check is stopped.
[>] (f2) : The check is started.

Control Panel Display



A :
"OTR SNR CK STR" : Indicates that a check is in execution.
"OTR SNR CK FIN" : Indicates that a check is in execution.

For the error messages below, sensor shielding or transmission state may be defective.

"ERROR !!
CCM UP SENSOR" : (DVR-20) Cassette compartment up sensor
(DVR-28) Inner cassette compartment up sensor
Outer cassette compartment up sensor

"ERROR !!
CST IN SENSOR" : Cassette in sensor

"ERROR !!
CST SIZE SNR" : (DVR-20) Cassette compartment size sensor
(DVR-28) Cassette size sensor M
Cassette size sensor L

"ERROR !!
CST DOWN SNR" : (DVR-20) Cassette compartment down sensor
(DVR-28) Inner cassette compartment down sensor
Outer cassette compartment down sensor

"ERROR !!
M SIDE SENSOR" : (DVR-20) Reel shift sensor (M)
(DVR-28) Reel shift sensor (S reel)

"ERROR !!
S SIDE SENSOR" : (DVR-20) Reel shift sensor (S)
(DVR-28) Reel shift sensor (T reel)

"ERROR !!
USR (CNR M) SNR" : (DVR-20) User center sensor (M cassette)
(DVR-28) Center sensor (M cassette)
Center sensor (L cassette)

"ERROR !!
USR (CNR S) SNR" : User center sensor (S cassette)

"ERROR !!
USR (S SIDE) SNR" : S-side user sensor

"ERROR !!
USR (T SIDE) SNR" : T-side user sensor

"ERROR !!
REC INH SENSOR" : Cassette cording sensor

"ERROR !!
CORD HOLE 1 SNR" : Cassette cording sensor 1

"ERROR !!
CORD HOLE 2 SNR" : Cassette cording sensor 2

"ERROR !!
CORD HOLE 3 SNR" : Cassette cording sensor 3

"ERROR !!
CORD HOLE 4 SNR" : Cassette cording sensor 4

For countermeasures, refer to Section 3-6-8. Countermeasures for Error Messages.

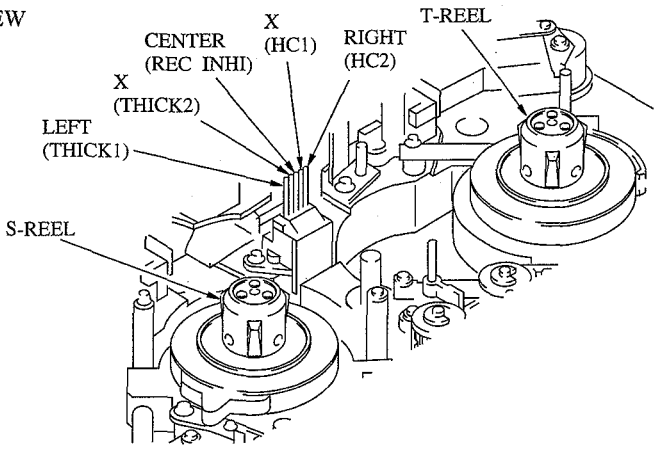
B : --XX : Displays the other sensor check step.

C : - - XXXXXXXB Displays binary data in hexadecimals.

1 : T-REEL SIDE USER FREE	0 : PUSH
1 : CORDING HOLE THICK1 FREE	0 : PUSH
1 : CORDING HOLE THICK2 FREE	0 : PUSH
1 : RECORD INHIBIT SW FREE	0 : PUSH
1 : CORDING HOLE HC1 FREE	0 : PUSH
1 : CORDING HOLE HC2 FREE	0 : PUSH
1 : T-REEL SIDE USER FREE	0 : PUSH

NOTE :

SWITCH POSITION VIEW



D : - - XXXB Displays binary data in hexadecimals.

1 : S-CASSETTE CENTER USER FREE	0 : PUSH
1 : M-CASSETTE CENTER USER FREE	0 : PUSH
1 : L-CASSETTE CENTER USER FREE	0 : PUSH (DVR-28のみ)

SV D2F DRUM WAVEFORM DIAGNOSTICS

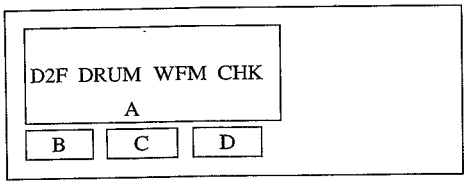
Outline

This command inspects the drum PG and FG waveforms (does not inspect automatically them).
It starts and locks the drum motor.
The VTR does not operate ordinarily during test mode operation.
During operation completion, cancel the test mode by entering the D0 test mode or turning off the power.

Key Operation

[<] (f1) ON : The check is stopped.
[>] (f2) ON : The check is started.

Control Panel Display



A : The messages below are displayed.
"DR WFM CHK SRT" : Indicates that the inspection of a "D2F" drum PG / FG waveform is being executed.
The inspection automatically stops after ten minutes.
"DR WFM CHK FIN" : The inspection of a "D2F" drum PG / FG waveform is completed.

B : No display appears.

C : --XX : Indicates the drum mode flag.
01H: Drum stop 78H: Drum lock

D : No display appears.

Specification

Confirm that a drum FG A signal (CN411-27C on the SP-15 board) and a drum FG B signal (CN411-28B on the SP-15 board) satisfy the conditions below.
The signal amplitude must be more than 1.5 V and less than 2.5 V.
The signal's DC level must be more than 4.2 V and less than 6.2 V.
Confirm that a drum PG signal (CN411-28C on the SP-15 board) satisfies the conditions below.
The signal amplitude must be more than 0.5 V and less than 1.1 V.
The signal's noise level must be less than 0.13 Vp-p.

3-6-6. UC Test Mode Menu

The UC (Ultra Sonic Guide control) test mode has the modes below.

(1) Mode C : Automatic adjustment mode.
The automatic adjustment mode is used for USG.
adjustment. In the automatic adjustment mode, another mode cannot be converted (except mode E).

(2) Mode D : Self-diagnosis mode
The self-diagnosis mode is used for USG diagno-sis.
In the self-diagnosis mode, another mode cannot be converted (except mode E).

To perform the UC test mode, shift the USG to the threading position in accordance with the procedure below.

(1) Turn the main power on.
(2) Press the [TEST] key.
(3) Press the [F6] (CHECKER) key.
(4) Press the [F1] (SP) key.
(5) Press the [F6] (F) key, the [2] and [5] keys of a 20-key, and the [SET] key.
(6) Confirm that the "F25 THREAD" message is displayed.
(7) Press cursor key [<] (f1) key continuously to enter the loading state.
(8) Press the [F12] (EXIT) key.

The UC test mode can be performed in accordance with the procedure below after the above operation.
(1) Press the [TEST] key.
(2) Press the [F6] (CHECKER) key.
(3) Press the [F3] (UC) key.
(4) The test mode item is specified and press the [SET] key.

Cancel the SP test mode in accordance with the procedure below after the UC test mode is terminated.
(1) Press the [TEST] key.
(2) Press the [F6] (CHECKER) key.
(3) Press the [F1] (SP) key.
(4) Press the [F6] (F) key, the [2] and [0] keys of a 20-key, and the [SET] key.
(5) Press the [F12] (EXIT) key.

List of UC Test Mode Items

Mode	Description
$, $$	MEMORY READ/WRITE
=0	UC RESET
C0	TEST MODE OFF (C mode cancellation)
C11	AUTO US ADJUSTMENT
C12	S-US OFFSET ADJUSTMENT
C13	T-US OFFSET ADJUSTMENT
C14	S-US GAIN ADJUSTMENT
C15	T-US GAIN ADJUSTMENT
D0	TEST MODE OFF (D mode cancellation)
D11	AUTO US CHECK
D12	S-USG CHECK
D13	T-USG CHECK

UC $, $$ MEMORY READ / WRITE

Outline

This command can read or write the data of the memory specified by UC CPU in bytes or words.
$ is used to read or write data in bytes, and $$ to read or write it in words.
This command is used in the factory.
If the NOVRAM data is changed, the VTR does not operate normally.

Note : This command cannot change NOVRAM data.
To change the NOVRAM data, enter the SP $, $$ command in an SP test mode menu.

UC =0 UC RESET

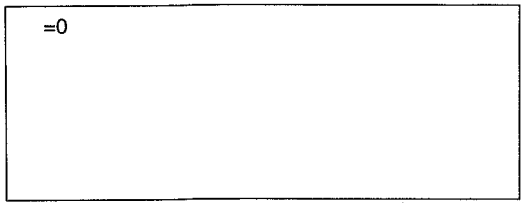
Outline

Entering this command can reset the UC board.

Operation

Enter the = 0 command using the function keys and numeric keypad on the control panel.

Control Panel Display



UC C11 : AUTO US ADJUSTMENT

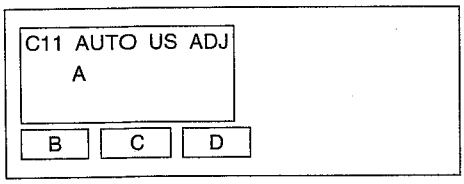
Outline

The supply and take-up USGs can be automatically adjusted in this test mode.
The automatic adjustment of "C12", "C13", "C14", and "C15" can be performed continuously.

Key operation

[>] (f2) ON : Starts the automatic adjustment.

Control Panel Display



A : The message below is displayed.

S-US OFS AJ SRT	: C12 automatic alignment is being performed.
T-US OFS AJ SRT	: C13 automatic alignment is being performed.
S-US G ADJ SRT	: C14 automatic alignment is being performed.
T-US G ADJ SRT	: C15 automatic alignment is being performed.
AUTO US ADJ FIN	: C11 automatic alignment is completed.

Error messages are displayed when a problem is detected dur-ing adjustments. Each adjustment then stops.

- "S-US IMP ERROR" : The supply USG resonance cannot be found or supply USG is disconnected.
- "S-US EXT IMP MAX" : High impedance outside supply USG resonance point.
- "S-US PHS MIN" : Maximum phase change near supply USG resonance is too small.

- "T-US IMP ERROR" : The take-up USG resonance cannot be found or take-up USG is disconnected.
- "T-US EXT IMP MAX" : High impedance outside take-up USG resonance point.
- "T-US PHS MIN" : Maximum phase change near take-up USG resonance is too small.

- "S-US UNLOCK" : High harmonic distortion of the supply USG or low impedance of the resonance point.

- "T-US UNLOCK" : High harmonic distortion of the take-up USG or low impedance of the resonance point.

B : 0101 : C11 automatic alignment is in the standby state.
0202 : C12 automatic alignment is being performed.
0303 : C13 automatic alignment is being performed.
Others : See the C14 and C15 items.

C : See the C12, C13, C14, and C15 items.

D : See the C12, C13, C14, and C15 items.

UC C12 : S-US OFFSET ADJUSTMENT

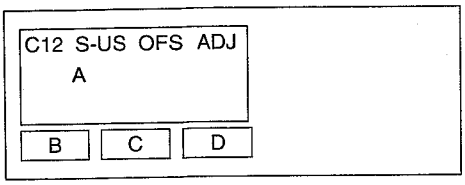
Outline

The pre-alignment voltage of the supply USG is automatically adjusted in this test mode.
To activate the supply USG, a VCO input voltage must be aligned so that it corresponds to the detected resonance frequency.
The VCO input voltage is determined by the sum of pre-alignment and fine-alignment voltages. In this test mode, the pre-alignment voltage is aligned with the fine-alignment voltage kept constant.
The pre-alignment voltage value does not change unless it is realigned.

Key Operation

[>] (f2) ON : Starts the automatic adjustment.

Control Panel Display



A : The message below is displayed.
S-US OFS AJ SRT : C12 automatic alignment is being performed.
S-US OFS AJ FIN : C12 automatic alignment is completed.

Error messages are displayed when abnormality is detected during adjustment. Adjustment then stops.

- "S-US IMP ERROR" : The supply USG resonance cannot be found or supply USG is disconnected.
- "S-US EXT IMP MAX" : High impedance outside supply USG resonance point.
- "S-US PHS MIN" : Maximum phase change near supply USG resonance is too small.

For countermeasures, refer to Section 3-6-8. Countermeasures for Error Messages.

B : 0202 : C12 is in the selection state.

C : Pre-alignment voltage value of the supply USG.

D : Pre-alignment voltage value for the supply USG resonance.

UC C13 : T-US OFFSET ADJUSTMENT

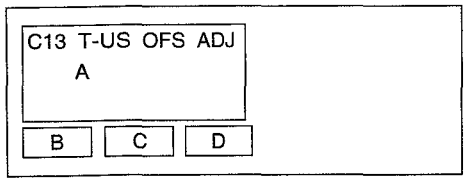
Outline

The pre-alignment voltage of the take-up USG is automatically adjusted in this test mode.
To activate the take-up USG, a VCO input voltage must be aligned so that it corresponds to the detected resonance frequency.
The VCO input voltage is determined by the sum of pre-alignment and fine-alignment voltages. In this test mode, the pre-alignment voltage is aligned with the fine-alignment voltage kept constant.
The pre-alignment voltage value does not change unless it is realigned.

Key Operation

[>] (f2) ON : Starts the automatic adjustment.

Control Panel Display



A : The message below is displayed.

T-US OFS AJ SRT	: C13 automatic alignment is being performed.
T-US OFS AJ FIN	: C13 automatic alignment is completed.

Error messages are displayed when a problem is detected during adjustment. Adjustment then stops.

- "T-US IMP ERROR" : The take-up USG resonance cannot be found or take-up USG is disconnected.
- "T-US EXT IMP MAX" : *High impedance outside take-up USG resonance point.*
- "T-US PHS MIN" : Maximum phase change near resonance is too small.

For countermeasures, refer to Section 3-6-8. Countermeasures for Error Messages.

B : 0303 : C13 is in the selection state.

C : Pre-alignment voltage value of the take-up USG.

D : Pre-alignment voltage value for the take-up USG resonance.

UC C14 : S-US GAIN ADJUSTMENT

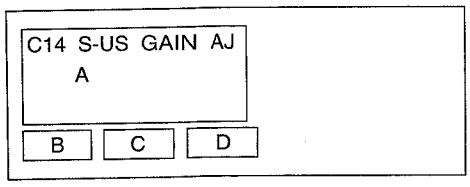
Outline

The driving output of the supply USG is automatically aligned in this test mode.
The output value is aligned so that the supply USG is driven in 100 mW, 200 mW, 400 mW, 600 mW, 800 mW, and 1000 mW.

Key Operation

[>] (f2) ON : Starts the automatic aligned.

Control Panel Display



A : The massage below is displayed.
S-US G ADJ SRT : C14 automatic adjustment is being performed.
S-US G ADJ FIN : C14 automatic adjustment is completed.

An error message is displayed when a problem is detected during adjustment. Adjustment then stops.

- "S-US UNLOCK" : High harmonic distortion of the supply USG or low impedance of the resonance point.

For countermeasures, refer to Section 3-6-8. Countermeasures for Error Messages.

B : Displays the output adjustment data when the supply USG is driven in 1000 mW as hexadecimal data in high-order 2 bytes, and the output adjustment data when it is driven in 800 mW as hexadecimal data in low-order 2 bytes.

C : Displays the output adjustment data when the supply USG is driven in 600 mW as hexadecimal data in high-order 2 bytes, and the output adjustment data when it is driven in 400 mW as hexadecimal data in low-order 2 bytes.

D : Displays the output adjustment data when the supply USG is driven in 200 mW as hexadecimal data in high-order 2 bytes, and the output adjustment data when it is driven in 100 mW as hexadecimal data in low-order 2 bytes.

UC C15 : T-US GAIN ADJUSTMENT

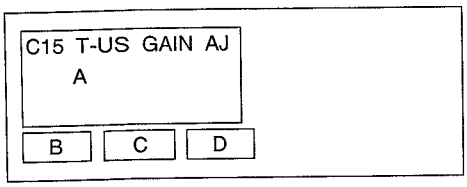
Outline

The driving output of the take-up USG is automatically aligned in this test mode.
The output value is aligned so that the take-up USG is driven in 100 mW, 200 mW, 400 mW, 600 mW, 800 mW, and 1000 mW.

Key Operation

[>] (f2) ON : Starts the automatic adjustment.

Control Panel Display



A : The messabe below is displayed.
T-US G ADJ SRT : C15 automatic alignment is being performed.
T-US G ADJ FIN : C15 automatic alignment is completed.

An error message is displayed when a problem is detected during adjustment. Adjustment then stops.

- "T-US UNLOCK" : High harmonic distortion of the take-up USG or low impedance of the resonance point.

For countermeasures, refer to Section 3-6-8. Countermeasures for Error Messages.

B : Displays the output adjustment data when the take-up USG is driven in 1000 mW as hexadecimal data in high-order 2 bytes, and the output adjustment data when it is driven in 800 mW as hexadecimal data in low-order 2 bytes.

C : Displays the output adjustment data when the take-up USG is driven in 600 mW as hexadecimal data in high-order 2 bytes, and the output adjustment data when it is driven in 400 mW as hexadecimal data in low-order 2 bytes.

D : Displays the output adjustment data when the take-up USG is driven in 200 mW as hexadecimal data in high-order 2 bytes, and the output adjustment data when it is driven in 100 mW as hexadecimal data in low-order 2 bytes.

UC D11 : AUTO US CHK

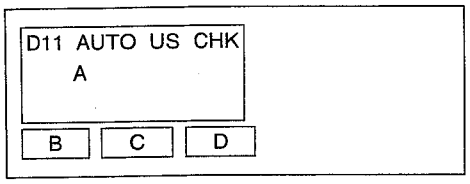
Outline

The supply and take-up USGs' self-diagnosis can be performed in this test mode.
The "D12" and "D13" self-diagnosis is performed continuous-ly.

Key Operation

[>] (f2) ON : Starts the self diagnosis.

Control Panel Display



A : The message below is displayed.
S-US CHECK SRT : D12 self-diagnosis is being performed.
T-US CHECK SRT : D13 self-diagnosis is being performed.
AUTO US CHK FIN : D11 self-diagnosis is completed.

Error messages are displayed when a problem is detected during adjustments. Each adjustment then stops

- "S-US IMP ERROR" : The supply USG resonance cannot be found or supply USG is disconnected.
- "S-US EXT IMP MAX" : High impedance outside the supply USG resonance point.
- "S-US PHS MIN" : Maximum phase change near resonance is too small.
- "S-US DIST MAX" : High harmonic distortion of the supply USG.
- "S-US IMP MIN" : Low resonance point's impedance of the supply USG.

- "T-US IMP ERROR" : The take-up USG resonance cannot be found or the take-up USG is disconnected.
- "T-US EXT IMP MAX" : High impedance outside take-up USG resonance point.
- "T-US PHS MIN" : Maximum phase change near resonance is too small.
- "T-US DIST MAX" : High harmonic distortion of the take-up USG.
- "T-US IMP MIN" : Low resonance point's impedance of the take-up USG.

For countermeasures, refer to Section 3-6-8. Countermeasures for Error Messages.

B : 0101 : D11 self-diagnosis is in the standby state.
0202 : D12 self-diagnosis is being performed.
0303 : D13 self-diagnosis is being performed.

C : Pre-alignment voltage values of the supply and take-up USG.

D : Pre-alignment voltage values for the resonance points of the supply and take-up USG.

UC D12 : S-USG CHECK

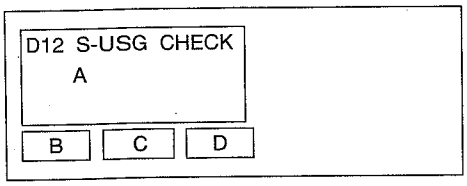
Outline

The self-diagnosis of the supply USG is performed in this test mode.
D12 diagnoses that the supply USG is in the normal operating state or in the deterioration state. An error message is displayed when a problem.

Key Operation

[>] (f2) ON : Starts the self-diagnosis.

Control Panel Display



A : The message below is displayed.
S-USG CHECK SRT : D12 self-diagnosis is being performed.
S-USG CHECK FIN : D12 self-diagnosis is completed.

Error messages are displayed when a problem is detected during adjustment. Adjustment then stops.

- "S-US IMP ERROR" : The supply USG resonance cannot be found or the supply USG is disconnected.
- "S-US EXT IMP MAX" : High impedance outside supply USG resonance point.
- "S-US PHS MIN" : Maximum phase change near resonance is tool small.
- "S-US DIST MAX" : High harmonic distortion of the supply USG.
- "S-US IMP MIN" : Low resonance point's impedance of the supply USG.

For countermeasures, refer to Section 3-6-8. Countermeasures for Error Messages.

B : 0202 : D12 is in the selection state.

C : Pre-alignment voltage value of the supply USG.

D : Pre-alignment voltage value for the supply USG resonance point.

UC D13 : T-USG CHECK

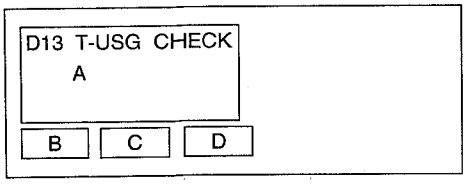
Outline

The self-diagnosis of the take-up USG is performed in this test mode.
D13 diagnoses that the take-up USG is in the normal operating state or in the deterioration state. An error message is displayed when a problem.

Key Operation

[>] (f2) ON : Starts the self-diagnosis.

Control Panel Display



A : The message below is displayed.
T-USG CHECK SRT : D13 self-diagnosis is being performed.
T-USG CHECK FIN : D13 self-diagnosis is completed.

Error messages are displayed when a problem during adjust-ment. Adjustment then stops.

- "T-US IMP ERROR" : The take-up USG resonance cannot be found or the take-up USG is disconnected.
- "T-US EXT IMP MAX" : High impedance outside take-up USG resonance point.
- "T-US PHS MIN" : Maximum phase change near resonance is too small.
- "T-US DIST MAX" : High harmonic distortion of the take-up USG.
- "T-US IMP MIN" : Low resonance point's impedance of the take-up USG.

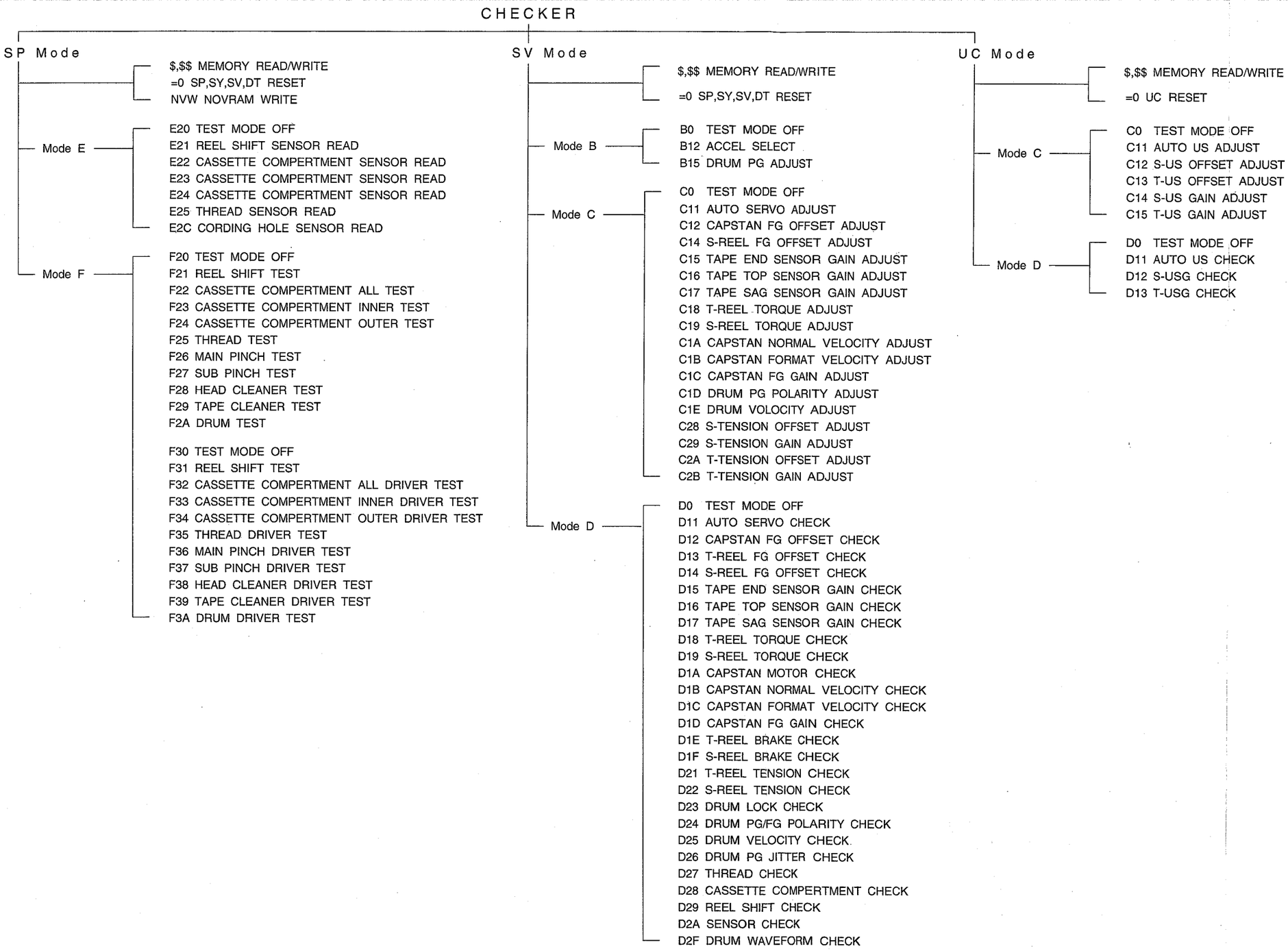
For countermeasures, refer to Section 3-6-8. Countermeasures for Error Messages.

B : 0303: D13 is in the selection state.

C : Pre-alignment voltage value of the take-up USG.

D : Pre-alignment voltage value for the take-up USG resonance point.

3-6-7. CHECKER MENU FROWCHART



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3-6-8. Countermeasures for Error Messages

Error Message	Command Executed	Error Content and Countermeasure
C SIZE NG	SP F22 F24	Detection error of cassette size is occurring. Countermeasure : • Insert cassette correctly, or remove cassette.
ERROR!! CAP FG LEVEL	SV C1C	Incorrect amplitude of capstan motor FG is detected. Countermeasure : • Execute command of [SV C12 CAPSTAN FG OFFSET ADJUST].
	SV D1D	Incorrect amplitude of capstan motor FG is detected. Countermeasure : • Execute commands of [SV C12 CAPSTAN FG OFFSET ADJUST] and [SV C1C CAPSTAN FG GAIN ADJUST]
ERROR!! CAPSTAN FG	SV C12	Cannot detect capstan FG. Countermeasure : 1. Confirm that the following circuit boards are correctly in serted in their home slots. DVR-20: MD-50, SV-133 DVR-28: MD-62, SSP-07 2. Confirm the correct wiring of capstan motor. 3. Check the following fuses of +14 V power line. DVR-20: F3 (FU-41 board), DVR-28: F2 (FU-53 board)
	SV D12	Cannot detect capstan FG. or detected incorrect duty ratio. Countermeasure : • Execute [SV C12 CAPSTAN FG OFFSET ADJUST] command.

Error Message	Command Executed	Error Content and Countermeasure
ERROR!! CAPSTAN MOTOR	SV C1A	Cannot rotate capstan motor in the rated record mode speed. Countermeasure : • Execute [SV C12 CAPSTAN FG OFFSET ADJUST] command.
	SV C1B	Cannot rotate capstan motor in the rated fast format speed. Countermeasure : • Execute [SV C12 CAPSTAN FG OFFSET ADJUST] command.
	SV C1C	Cannot rotate capstan motor in the rated speed. Countermeasure : • Execute [SV C12 CAPSTAN FG OFFSET ADJUST] command.
	SV D1A	Incorrect capstan speed is detected when driven with 3.5V. Countermeasure : • Execute [SV C12 CAPSTAN FG OFFSET ADJUST] command.
	SV D1B	Cannot rotate capstan motor in the rated record mode speed. Countermeasure : • Execute [SV C12 CAPSTAN FG OFFSET ADJUST] command.
	SV D1C	Cannot rotate capstan motor in the rated fast format speed. Countermeasure : • Execute [SV C12 CAPSTAN FG OFFSET ADJUST] command.
ERROR!! CASSECON MOTOR	SV D28	Lift-up / down of cassette compartment does not complete within the rated period of time. Or, cassette compartment up / down-hold is not correctly done. Countermeasure : 1. Confirm that the following printed circuit boards are correctly inserted into their home slots. DVR-20 : MD-50, SP-15, SV-133 DVR-28 : MD-62, SSP-07 2. Confirm connection of cassette compartment motor. 3. Confirm that cassette compartment sensor has no problem. 4. Confirm that the following fuses in 14V power supply system are good. DVR-20 : F3 (FU-41 board), DVR-28 : F2 (FU-53 board).

Error Message	Command Executed	Error Content and Countermeasure
ERROR!! CCM UP SENSOR	SV D27 D28 D29 D2A	Detected trouble in the light-block / pass operation of the cassette compartment up sensor. Countermeasure : • Confirm that the following printed circuit boards are correctly inserted into their home slots. DVR-20 : SE-72, SP-15 DVR-28 : SE-122, SE-123, SE-135, SSP-07
ERROR!! CENTER SENSOR	SV C17	Cannot adjust the center sensor output to 2.4V ± 0.1V. Countermeasure : • Confirm that the following printed circuit boards are correctly inserted into their home slots. DVR-20 : PC-65, SV-133 DVR-28 : PC-65, SSP-07
	SV D17	Detected trouble in the center sensor output. Countermeasure : • Execute [SV C17 TAPE SAG SENSOR GAIN ADJUST] command.
ERROR!! CORD HOLE 1 (2, 3 or 4) SNR	SV D27 D28 D29 D2A	Detected trouble in the light-block / pass operation of the cassette coding sensor 1 (2, 3, or 4). Countermeasure : • Confirm that the following printed circuit boards are correctly inserted into their home slots. DVR-20 : SE-72, SP-15 DVR-28 : SE-122, SE-123, SE-135, SSP-07
ERROR!! CP FFOR VELO	SV C1B	Even after adjustment for 20 seconds, the output from the speed error measurement block cannot be made minimum. Countermeasure : • Execute [SV C12 CAPSTAN FG OFFSET ADJUST] command.
	SV D1C	Detected trouble in the output of the speed error measurement block. Countermeasure : • Execute [SV C12 CAPSTAN FG OFFSET ADJUST] and [SV C1B CAPSTAN FORMAT VELOCITY ADJUST] commands.

Error Message	Command Executed	Error Content and Countermeasure
ERROR!! CP FVL UNSTBL	SV C1B	Fluctuation in the capstan motor drive voltage is too big. Countermeasure : • Execute [SV C12 CAPSTAN FG OFFSET ADJUST] command.
	SV D1C	Fluctuation in the capstan motor drive voltage is too big. Countermeasure : • Execute [SV C12 CAPSTAN FG OFFSET ADJUST] and [SV C1B CAPSTAN FORMAT VELOCITY ADJUST] commands.
ERROR!! CP NORM VELO	SV C1A	Even after adjustment for 20 seconds, the output from the speed error measurement block cannot be made minimum. Countermeasure : • Execute [SV C12 CAPSTAN FG OFFSET ADJUST] command.
	SV D1B	Detected trouble in the output of the speed error measurement block. Countermeasure : • Execute [SV C12 CAPSTAN FG OFFSET ADJUST] and [SV C1A CAPSTAN NORMAL VELOCITY ADJUST] commands.
ERROR!! CP NVL UNSTBL	SV C1A	Fluctuation in the capstan motor drive voltage is too big. Countermeasure : • Execute [SV C12 CAPSTAN FG OFFSET ADJUST] command.
	SV D1B	Fluctuation in the capstan motor drive voltage is too big. Countermeasure : • Execute [SV C12 CAPSTAN FG OFFSET ADJUST] and [SV C1A CAPSTAN NORMAL VELOCITY ADJUST] commands.

Error Message	Command Executed	Error Content and Countermeasure
ERROR!! CST DOWN SNR	SV D27 D28 D29 D2A	Detected trouble in the light-block / pass operation of the cassette compartment down sensor. Countermeasure : • Confirm that the following printed circuit boards are correctly inserted into their home slots. DVR-20 : SE-72, SP-15 DVR-28 : SE-122, SE-123, SE-135, SSP-07
ERROR!! CST IN SENSOR	SV D27 D28 D29 D2A	Detected trouble in the light-block / pass operation of the cassette compartment in sensor. Countermeasure : • Confirm that the following printed circuit boards are correctly inserted into their home slots. DVR-20 : SE-72, SP-15 DVR-28 : SE-122, SE-123, SE-135, SSP-07
ERROR!! CST SIZE SNR	SV D27 D28 D29 D2A	Detected trouble in the light-block/pass operation of the cassette compartment size sensor. Countermeasure : • Confirm that the following printed circuit boards are correctly inserted into their home slots. DVR-20 : SE-72, SP-15 DVR-28 : SE-122, SE-123, SE-135, SSP-07
ERROR!! DR PG POLARITY	SV D24	Cannot rotate drum motor in the rated speed. And as the result of PG polarity measurement, it does not coincide with the adjustment data. Countermeasure : • Execute [SV C1D DRUM PG POLARITY ADJUST] command.
ERROR!! DRUM LOCK TIME	SV D23	Cannot rotate drum motor in the rated speed. Or, detected trouble in rise-up time and fall-down time of dthe drum motor. Countermeasure : • Execute [SV C1E DRUM VELOCITY ADJUST] command.

Error Message	Command Executed	Error Content and Countermeasure
ERROR!! DRUM MOTOR	SV C1D	During PG polarity adjustment, drum motor cannot rotate in the rated speed. Countermeasure : 1. Confirm that the following printed circuit boards are correctly inserted into their home slots. DVR-20 : MD-50, SP-15, SV-133 DVR-28 : MD-62, SSP-07 2. Confirm connection of drum motor. 3. Confirm that the following fuses in 40V power supply system are good. DVR-20 : F2 (FU-41 board), DVR-28 : F3 (FU-53 board).
	SV C1E	During speed adjustment, drum motor cannot rotate up to 95 % of its rated speed. Or, error voltage after completion of adjustment is too big. Countermeasure : 1. Confirm that the following printed circuit boards are correctly inserted into their home slots. DVR-20 : MD-50, SP-15, SV-133 DVR-28 : MD-62, SSP-07 2. Confirm connection of drum motor. 3. Confirm that the following fuses in 40V power supply system are good. DVR-20 : F2 (FU-41 board), DVR-28 : F3 (FU-53 board).
ERROR!! DRUM PG JITTER	SV D26	Cannot rotate drum motor in the rated speed. And detected trouble in the maximum value of PG jitter measurement. Countermeasure : • Execute [SV C1D DRUM PG POLARITY ADJUST] and [SV C1E DRUM VELOCITY ADJUST] commands.
ERROR!! DRUM VELOCITY	SV D25	Could not rotate the drum motor in the rated speed. Or, detected trouble in the measured error voltage. Countermeasure : • Execute [SV C1E DRUM VELOCITY ADJUST] command.

Error Message	Command Executed	Error Content and Countermeasure
ERROR!! END SENSOR	SV C15	Cannot adjust the end sensor output to 2.4V ± 0.1V. Countermeasure : • Confirm that the following printed circuit boards and connectors are correctly inserted into their home slots. DVR-20 : PC-63, SV-133 DVR-28 : PC-63, SSP-07
	SV D15	Detected incorrect condition in the end sensor output. Countermeasure : • Execute [SV C15 TAPE END SENSOR GAIN ADJUST] command.
ERROR!! M SIZE SENSOR	SV D27 D28 D29 D2A	Detected trouble in the light-block / pass operation of the M side reel shift sensor. Countermeasure : • Confirm that the following printed circuit boards and conncectors are correctly inserted into their home slots. DVR-20 : SE-72, SP-15 DVR-28 : SE-122, SE-123, SE-135, SSP-07
ERROR!! REC INH SENSOR	SV D27 D28 D29 D2A	Detected trouble in the light-block / pass operation of the cassette coding sensor. Countermeasure • Confirm that the following printed circuit boards and conncectors are correctly inserted into their home slots. DVR-20 : SE-72, SP-15 DVR-28 : SE-122, SE-123, SE-135, SSP-07
ERROR!! SHIFT MOTOR	SV D29	Reel shift operation does not complete within the rated period of time. Or, reel shift hold is not correctly done. Countermeasure : 1. Confirm that the following printed circuit boards are correctly inserted into their home slots. DVR-20 : MD-50, SP-15, SV-133 DVR-28 : MD-62, SSP-07 2. Confirm connection of reel shift motor. 3. Confirm that reel shift sensor and reel shift position meter have no problem. 4. Confirm that the following fuses in 14V power supply system are good. DVR-20 : F3(FU-41 board), DVR-28 : F2(FU-53 board).

Error Message	Command Executed	Error Content and Countermeasure
ERROR!! S-REEL BRAKE	SV D1F	Detected incorrect condition in brake power. Countermeasure : 1. Execute [SV D14 S-REEL FG OFFSET CHECK] and [SV D19 S-REEL TORQUE CHECK] commands. 2. When the above commands could be completed successfully, make the following adjustments. DVR-20 : Replace brake shoe. DVR-28 : Select proper position of brake spring hook position. If adjustment cannot be done, replace brake shoe.
ERROR!! S-REEL FG	SV C14	Cannot detect the S Reel FG. Countermeasure : 1. Confirm that the following printed circuit boards are correctly inserted into their home slots. DVR-20 : MD-50, SV-133 DVR-28 : MD-62, SSP-07 2. Confirm connection of S Reel motor. 3. Confirm that the following fuses in 40V power supply system are good. DVR-20 : F2 (FU-41 board), DVR-28 : F3 (FU-53 board).
	SV D14	Cannot detect the S Reel FG. Or, detected incorrect condition in duty ratio. Countermeasure : • Execute [SV C14 S-REEL FG OFFSET ADJUST] command. Detected incorrect condition in the tension data.
ERROR!! S-REEL TENSITON	SV D22	Countermeasure : 1. Confirm that the following printed circuit boards and connectors are correctly inserted into their home slots. DVR-20 : DET-19, SV-133 DVR-28 : DET-19, SSP-07 2. Make adjustment of S side Tension Regulator.

Error Message	Command Executed	Error Content and Countermeasure
ERROR!! S-REEL TORQUE	SV C19	Cannot execute the S Reel Torque adjustment. Countermeasure : 1. Confirm that the following printed circuit boards are correctly inserted into their home slots. DVR-20 : MD-50, SV-133 DVR-28 : MD-62, SSP-07 2. Confirm connection of S Reel motor. 3. Confirm that the following fuses in 40V power supply system are good. DVR-20 : F2 (FU-41 board), DVR-28 : F3 (FU-53 board).
	SV D19	Result of measurement varies too much. Or, correction value is too far from appropriate value. Countermeasure : • Execute [SV C19 S-REEL TORQUE ADJUST] command.
ERROR!! S SIZE SENSOR	SV D27 D28 D29 D2A	Detected trouble in the light-block / pass operation of the S side Reel Shift Sensor. Countermeasure : • Confirm that the following printed circuit boards are correctly inserted into their home slots. DVR-20: SE-72, SP-15 DVR-28: SE-122, SE-123, SE-135, SSP-07
ERROR!! THREAD MOTOR	SV D27	Threading / unthreading of tape cassette does not complete within the rated period of time. Or, thread-hold / unthread-hold is not correctly done. Countermeasure : 1. Confirm that the following printed circuit boards are correctly inserted into their home slots. DVR-20 : MD-50, SP-15, SV-133 DVR-28 : MD-62, SSP-07 2. Confirm connection of threading motor. 3. Confirm that threading position meter has no problem. 4. Confirm that the following fuses in 14V power supply system are good. DVR-20 : F3 (FU-41 board), DVR-28 : F2 (FU-53 board).
ERROR!! TOP SENSOR	SV C16	Cannot adjust the top sensor output to 2.4V ± 0.1V. Countermeasure : • Confirm that the following printed circuit boards and connectors are correctly inserted into their home slots. DVR-20 : PC-63, SV-133 DVR-28 : PC-63, SSP-07
	SV D16	Detected incorrect condition in the top sensor output. Countermeasure : • Execute [SV C16 TAPE TOP SENSOR GAIN ADJUST] command.

Error Message	Command Executed	Error Content and Countermeasure
ERROR!! T-REEL BRAKE	SV D1E	Detected incorrect condition in brake power. Countermeasure : 1. Execute [SV D13 T-REEL FG OFFSET CHECK] and [SV D18 T-REEL TORQUE CHECK] commands. 2. When the above commands could be completed successfully, make the following adjustments. DVR-20 : Replace brake shoe. DVR-28 : Select proper position of brake spring hook position. If adjustment cannot be done, replace brake shoe.
ERROR!! T-REEL FG	SV C13	Cannot detect the T Reel FG. Countermeasure : 1. Confirm that the following printed circuit boards are correctly inserted into their home slots. DVR-20 : MD-50, SV-133 DVR-28 : MD-62, SSP-07 2. Confirm connection of T Reel motor. 3. Confirm that the T Reel Brake has no problem. 4. Confirm that the following fuses in 40V power supply system are good. DVR-20 : F2 (FU-41 board), DVR-28 : F3 (FU-53 board).
	SV D13	Cannot detect the T Reel FG. Or, detected incorrect condition in duty ratio. Countermeasure : • Execute [SV C13 T-REEL FG OFFSET ADJUST] command.
ERROR!! T-REEL TENSION	SV D21	Detected incorrect condition in the tension data. Countermeasure : 1. Confirm that the following printed circuit boards and connectors are correctly inserted into their home slots. DVR-20 : DET-18, SV-133 DVR-28 : DET-18, SSP-07 2. Make adjustment of T side Tension Regulator.

Error Message	Command Executed	Error Content and Countermeasure
ERROR!! T-REEL TORQUE	SV C18	Cannot execute the T Reel Torque adjustment. Countermeasure : 1. Confirm that the following printed circuit boards are correctly inserted into their home slots. DVR-20 : MD-50, SV-133 DVR-28 : MD-62, SSP-07 2. Confirm connection of T Reel motor. 3. Confirm that the T Reel Brake has no problem. 4. Confirm that the following fuses in 40V power supply system are good. DVR-20 : F2 (FU-41 board), DVR-28 : F3 (FU-53 board).
	SV D18	Result of measurement varies too much. Or, correction value is too far from appropriate value. Countermeasure : • Execute [SV C18 T-REEL TORQUE ADJUST] command.
ERROR!! USR (CNR M) SNR	SV D27 D28 D29 D2A	Detected trouble in the light-block / pass operation of the M side User Center Sensor. Countermeasure : • Confirm that the following printed circuit boards are correctly inserted into their home slots. DVR-20 : SE-72, SP-15 DVR-28 : SE-122, SE-123, SE-135, SSP-07
ERROR!! USR (CNR S) SNR	SV D27 D28 D29 D2A	Detected trouble in the light-block / pass operation of the S side User Center Sensor. Countermeasure : • Confirm that the following printed circuit boards are correctly inserted into their home slots. DVR-20 : SE-72, SP-15 DVR-28 : SE-122, SE-123, SE-135, SSP-07
ERROR!! USR (S SIDE) SNR	SV D27 D28 D29 D2A	Detected trouble in the light-block / pass operation of the S side User Sensor. Countermeasure : • Confirm that the following printed circuit boards are correctly inserted into their home slots. DVR-20 : SE-72, SP-15 DVR-28 : SE-122, SE-123, SE-135, SSP-07
ERROR!! USR (T SIDE) SNR	SV D27 D28 D29 D2A	Detected trouble in the light-block / pass operation of the T side User Sensor. Countermeasure : • Confirm that the following printed circuit boards are correctly inserted into their home slots. DVR-20 : SE-72, SP-15 DVR-28 : SE-122, SE-123, SE-135, SSP-07

Error Message	Command Executed	Error Content and Countermeasure
NOT CAS UP	SP F21 F25	Cassette compartment does not lift up. Countermeasure : • Execute [SP F22 CASSETTE COMPARTMENT ALL TEST] command.
NOT EJECT	SP F21 F22 F23 F24 F25 F26 F27 F29 F2A	VTR is not in the eject mode. Countermeasure : • Put the equipment into eject mode.
NOT IN DWN	SP F24	Inner compartment does not move down. Countermeasure : • Execute [SP F23 CASSETTE COMPARTMENT INNER TEST] command to move down the inner cassette compartment.
NOT OUT UP	SP F23	Outer compartment does not move up. Countermeasure : • Execute [SP F24 CASSETTE COMPARTMENT OUTER TEST] command to move up the outer cassette compartment.
NOT PIN OFF	SP F25	Pinch Roller does not turn OFF. Countermeasure : • Execute [SP F26 MAIN PINCH TEST] command to set the Pinch Roller OFF.
NOT R POS L NOT R POS M NOT R POS S	SP F22 F24	Reel position does not match the cassette size. Countermeasure : 1. Execute [SP F21 REEL SHIFT TEST] command to set the Reel Shift position. 2. Remove cassette.
NOT UNTHER	SP F22 F24	Threading Arm is not in the unthreaded position. Countermeasure : • Execute [SP F25 THREAD TEST] command to establish the unthread ed end condition.

Error Message	Command Executed	Error Content and Countermeasure
S-US DIST MAX	UC D11 D12	Harmonic distortion is too much in S side USG. Countermeasure : • Replace by exchanging the connectors CN821 and CN822 on UC-2 board, and try to execute command. If the same error message appears, replace the S side USG.
S-US EXT IMP MAX	UC C11 C12 D11 D12	Impedance outside resonant point in S side USG is too high. Countermeasure : • Replace by exchanging the connectors CN821 and CN822 on UC-2 board, and try to execute command. If the same error message appears, replace the S side USG.
S-US IMP ERROR	UC C11 C12 D11 D12	Resonant point does not exist in S side USG. Or, wire is open. Countermeasure : 1. Confirm connection of S side USG. 2. Confirm that the USG is in the threaded end position. <If the error message appears again, even after the above countermeasure is taken.> • Replace by exchanging the connectors CN821 and CN822 on UC-2 board, and try to execute command. If the same error message appears, replace the S side USG.
S-US IMP MIN	UC D11 D12	Resonant point impedance of the S side USG is too low. Countermeasure : • Replace by exchanging the connectors CN821 and CN822 on UC-2 board, and try to execute command. If the same error message appears, replace the S side USG.
S-US PHS MIN	UC C11 C12 D11 D12	The maximum phase change around the resonant point of S side USG is small. Countermeasure : • Replace by exchanging the connectors CN821 and CN822 on UC-2 board, and try to execute command. If the same error message appears, replace the S side USG.

Error Message	Command Executed	Error Content and Countermeasure
S-US UNLOCK	UC C11 C14	Harmonic distortion of S side USG is too big. Or, resonant point impedance is low. Countermeasure : • Confirm that UC-2 board has not trouble. • Replace by exchanging the connectors CN821 and CN822 on UC-2 board, and try to execute command. If the same error message appears, replace the S side USG.
THR POS NG	SP F26 F27	Threading Arm is not in the threaded end or in the unthreaded end position. Countermeasure : • Execute [SP F25 THREAD TEST] command to establish the unthreaded end or threaded end condition.
T-US DIST MAX	UC D11 D13	Harmonic distortion is too much in T side USG. Countermeasure : • Replace by exchanging the connectors CN821 and CN822 on UC-2 board, and try to execute command. If the same error message appears, replace the T side USG.
T-US EXT IMP MAX	UC C11 C13 D11 D13	Impedance outside resonant point in T side USG is too high. Countermeasure : • Replace by exchanging the connectors CN821 and CN822 on UC-2 board, and try to execute command. If the same error message appears, replace the T side USG.
T-US IMP ERROR	UC C11 C13 D11 D13	Resonant point does not exist in T side USG. Or, wire is open. Countermeasure : 1. Confirm connection of T side USG. 2. Confirm that the USG is in the threaded end position. <If the error message appears again, even after the above countermeasure is taken.> • Replace by exchanging the connectors CN821 and CN822 on UC-2 board, and try to execute command. If the same error message appears, replace the T side USG.

Error Message	Command Executed	Error Content and Countermeasure
T-US IMP MIN	UC D11 D13	Resonant point impedance of the T side USG is too low. Countermeasure : • Replace by exchanging the connectors CN821 and CN822 on UC-2 board, and try to execute command. If the same error message appears, replace the T side USG.
T-US PHS MIN	UC B11 C11 C13 D11 D13	The maximum phase change around the resonant point of T side USG is small. Countermeasure : • Replace by exchanging the connectors CN821 and CN822 on UC-2 board, and try to execute command. If the same error message appears, replace the T side USG.
T-US UNLOCK	UC C11 C15	Harmonic distortion of T side USG is too big. Or, resonant point impedance is low. Countermeasure : • Confirm that UC-2 board has not trouble. • Replace by exchanging the connectors CN821 and CN822 on UC-2 board, and try to execute command. If the same error message appears, replace the T side USG.

SECTION 3
TEST MENU

FOR BKDV-200/201

3-1. OUTLINE

The TEST menu is an important item when maintaining, checking, and repairing the unit.
It can be set in a menu format by the key operation on the control panel.
Press the [SHIFT] and [SET UP] keys on the control panel at the same time to display the SYSTEM SCROLL menu.
Next, turn the search dial clockwise while pressing the [ENTRY] and Center keys on the control panel simultaneously.
The screen shown in Fig. 3-2 is then displayed on the FL panel.

NOTE : The TEST menu is not displayed when the [ENTRY] and Center keys are not pressed simultaneously.
The menus indicated by ▒▒▒ in Table 3-1 are described in this section.

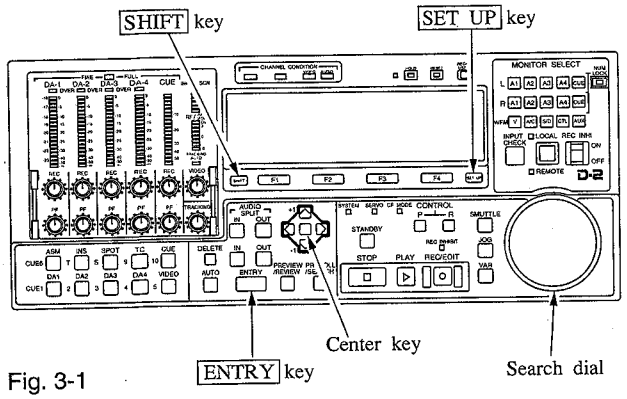


Fig. 3-1

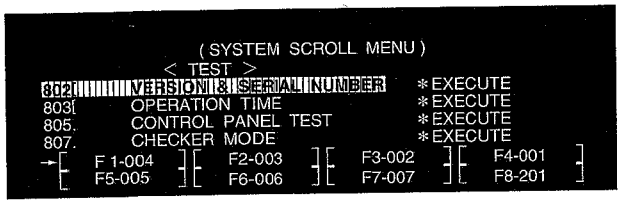


Fig. 3-2 FL Panel Display

Menu No.	Menu	Description
801		
802	VERSION & SERIAL NUMBER	Refer to BKDV-200/201 Maintenance Manual.
803	OPERATION TIME	Refer to Section 3-2.
804	CONTROL PANEL TEST	Refer to BKDV-200/201 Maintenance Manual.
805		
806		
807	CHECKER MODE	Refer to Section 3-6.
808	PROCESSOR SYSTEM EE TST	Refer to Section 3-4.
809		
810	MULTI-LOOP SOURCE	Refer to Section 3-5.
811	MULTI-LOOP INTERNAL SG	Refer to Section 3-5.
812	MULTI-LOOP LOOP COUNT	Refer to Section 3-5.
813		
814		
815	RF PB ADJUST MODE	Refer to Section 3-3.
816	RF REC ADJUST MODE	Refer to Section 3-3.
817	RF ENVELOPE	Refer to Section 3-3.

Table. 3-1

3-2. OP TIME MENU

The OP (OPERATION) TIME menu displays the operating hour, head drum rotating hour, head working hour, tape traveling hour, and time of cassette threading / unthreading operations. When performing the periodic check of the unit, use this menu to check the total operating hour and the time of cassette threading / unthreading operations.

How to Enter the Menu Mode

Press the keys on the control panel in the following sequence:

1. Press the [SET UP] key while pressing the [SHIFT] key.
   Select the SYSTEM SCROLL menu.
2. Pressing the [ENTRY] key while pressing the Center key, select the TEST menu with the Search dial.
3. Turn the search dial clockwise or move the cursor to 803 (OPERATION TIME) using a cursor [V] key.
4. Press the cursor [>] key and move the cursor to EXECUTE.
5. Press the cursor [^] key, then execute.

How to Exit the Menu Mode

Press the [SET UP] key to return to the control panel's initial screen. Press this key again.
The display can then return to the OP TIME test menu screen (screen in step 3).

Explanation of Display

OPERATION	: Total operating hour is displayed.
DRUM RUNNING	: Head drum running hour and resettable drum running hour are displayed.
HEAD	: Head working hour and resettable head working hour are displayed.
TAPE TRAVEL	: Tape traveling hour (calculated in tape length) is displayed.
THREADING	: The time of cassette threading / unthreading operations is displayed. (Cassette threading / unthreading is counted as one operation.)

The display shows both total hour and resettable total hour for the drum running hour and head working hour.
Press the [F1] key while holding down the [ENTRY] key to reset the right-hand value of the drum running hour.
Press the [F2] key while holding down the [ENTRY] key to reset the right-hand value of the head working hour.

3-3. RF MENU

This menu is used for checking and adjusting the RF signal system.

Note : The default value is set when shipped from the factory. If the unit is not adjusted correctly in this menu, good-quality video and audio outputs may not be obtained. For details, refer to each section of adjustment.

3-3-1. RF ENVELOPE Menu

The RF ENVELOPE menu displays the envelope of an RF output.

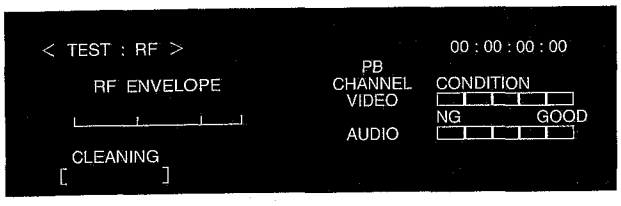
How to Enter the Menu Mode

1. Press the [SET UP] key while pressing the [SHIFT] key.
   Select the SYSTEM SCROLL menu.
2. Pressing the [ENTRY] key while pressing the Center key, select the TEST menu with the Search dial.
3. Turn the search dial clockwise or move the cursor to 817 (RF ENVELOPE) using a cursor [V] key.
4. Press the cursor [>] key and move the cursor to EXECUTE.
5. Press the cursor [^] key, then execute.

How to Exit the Menu Mode

Press the [SET UP] key to return to the control panel's initial screen. Press this key again.
The display can then return to the RF ENVELOPE test menu screen (screen in step 3).

Explanation of Display



RF ENVELOPE : RF meter
PB CHANNEL CONDITION : Error rate indicator.
The error rate of video and audio channels is displayed in 5 levels.

F1 : Cleaning roller controller
If heads are clogged, error rate indicators indicate "NG". In this case, keep the F1 (CLEANING) key pressed to clean the head.
After cleaning, confirm that the error rate indicators indicate "GOOD".
For details, refer to Section 2-10, Cleaning Procedures for Head Clogging.

NOTE 1 : Clean the head in the PLAY or REC mode.
NOTE 2 : For excessive clogging, the head cannot be cleaned completely.

3-3-2. RF PB ADJUST Menu

The RF PB ADJUST menu monitors the error occurring in a PB signal during normal PB and displays the error rate.

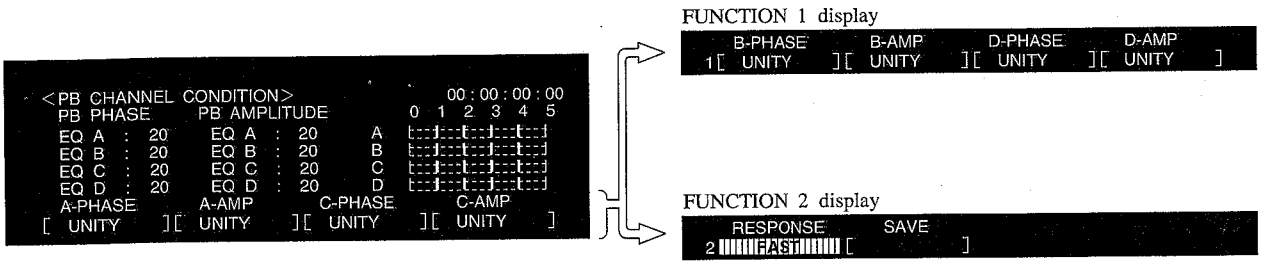
How to Enter the Menu Mode

1. Pressing the [SET UP] key while pressing the [SHIFT] key.
   Select the SYSTEM SCROLL menu.
2. Pressing the [ENTRY] key while pressing the Center key, select the TEST menu with the Search dial.
3. Turn the search dial clockwise or move the cursor to 815 (RF PB ADJUST MODE) using a cursor [v] key.
4. Press the cursor [>] key and move the cursor to EXECUTE.
5. Press the cursor [^] key, then execute.
   The RF PB ADJUST screen shown in Fig. 3-4 is displayed on the FL panel.
   Press the [SHIFT] key to display each menu. Select the desired menu using [F1] through [F4] keys.

How to Exit the Menu Mode

Press the [SET UP] key to return to the control panel's initial screen. Press this key again.
The display can then return to the RF PB ADJUST test menu screen (screen in step 3).

Explanation of Display



NOTE : The function display in the function key changes as follows every time the [SHIFT] key is pressed :

- Display when the [SHIFT] key is not pressed : FUNCTION 0 display
- Display when the [SHIFT] key is pressed once in a FUNCTION 1 display : FUNCTION 1 display
- Display when the [SHIFT] key is pressed two times in a FUNCTION 1 display : FUNCTION 2 display

Function Key	Display	Function	Setting
F1	A-PHASE	Equalizer CH-A Phase Adjustment	UNITY / VAR
F2	A-AMP	Equalizer CH-A Frequency Response Characteristic Adjustment	UNITY / VAR
F3	C-PHASE	Equalizer CH-C Phase Adjustment	UNITY / VAR
F4	C-AMP	Equalizer CH-C Frequency Response Characteristic Adjustment	UNITY / VAR
SHIFT, F1	B-PHASE	Equalizer CH-B Phase Adjustment	UNITY / VAR
SHIFT, F2	B-AMP	Equalizer CH-B Frequency Response Characteristic Adjustment	UNITY / VAR
SHIFT, F3	D-PHASE	Equalizer CH-D Phase Adjustment	UNITY / VAR
SHIFT, F4	D-AMP	Equalizer CH-D Frequency Response Characteristic Adjustment	UNITY / VAR
SHIFT x 2, F1	RESPONSE	Error Rate Display Mode Select	FAST / SLOW
SHIFT x 2, F2	SAVE	RF Controll Data Save	

FUNCTION 0 display

F1 : Equalizer CH-A Phase Adjustment
F2 : Equalizer CH-A Frequency Response Characteristic Adjustment
F3 : Equalizer CH-C Phase Adjustment
F4 : Equalizer CH-C Frequency Response Characteristic Adjustment

FUNCTION 1 display

F1 : Equalizer CH-B Phase Adjustment
F2 : Equalizer CH-B Frequency Response Characteristic Adjustment
F3 : Equalizer CH-D Phase Adjustment
F4 : Equalizer CH-D Frequency Response Characteristic Adjustment

Press the F1 through F4 keys. The display in brackets [ ] on the screen is inverted corresponding to each key. The channels above can be then specified. Press the F1 through F4 keys again. The display goes off. Only the specified channel is adjusted. The adjustment above can be performed when the Center key is pressed and when the inversion block is set to VAR. For the adjustment, refer to Section 13, RF Signal System Adjustment.

FUNCTION 2 display

[F1] : RESPONSE

This key is used for selecting a response speed for the CHANNEL CONDITION display (error rate display of each channel). The response speed setting can be changed from "FAST" to "SLOW" and vice versa every time this key is pressed.

FUNCTION 2 display

[F2] : SAVE

The control data written in NOVRAM is transferred to the nonvolatile memory (NOVRAM) when this key is pressed. The data changed by the equalizer phase adjustment and equalizer frequency response characteristic adjustment cannot be written in NOVRAM as it is. Therefore, to write the value after adjustment in UNITY, transfer the control data to NOVRAM. The data transfer is performed by the following procedure:

1. Press the [F2] (SAVE) key. The display below appears in the message area on the right of the screen.

   GO TO
   CHECKER MENU
   (807)
   AND
   PUSH F4 (NVW)

2. Press the [SET UP] key, then press the [SHIFT] key while holding down the [SET UP] key.
3. Press the cursor [v] key or turn the search dial and move the cursor to [807 CHECKER MODE].
4. Press the cursor [>] key and move the cursor to EXECUTE. Press the cursor [^] key, then execute.
5. Press the [F4] (NVW) key, then display the sheet plane of the monitor select key and press the SET key.
6. Press the [F3] (/) key to display the changed address. After confirming the address, press the [F3] (/) key continuously until message "PUSH NVWR SW" is displayed. To stop the operation halfway, press the [SET UP] key.
7. After message "PUSH NVWR SW" is displayed, press switch S71 (NVWR SW) on the SP-15 board (DVR-20 series) or SSP-07 board (DVR-28 series). Data transfer then begins.
8. Confirm that message "READY" is displayed on the control panel. Data transfer is then completed. Turn the unit power off. When the unit is powered on again, the UNITY value changes.

3-3-3. RF REC ADJUST Menu

The RF REC ADJUST menu compares a REC signal and simultaneous PB signal during REC and PB and displays the error rate.

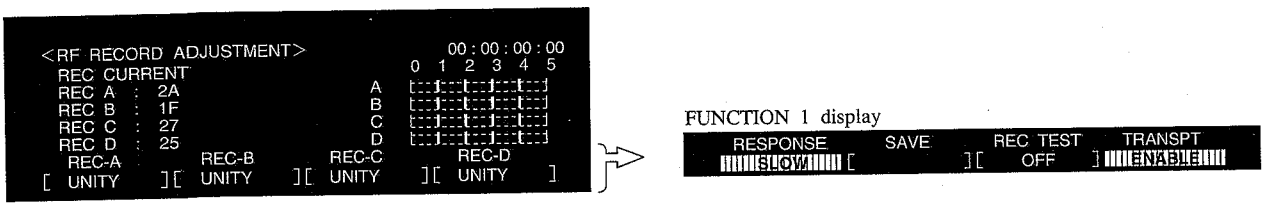
How to Enter the Menu Mode

1. Press the [SET UP] key while pressing the [SHIFT] key.
   Select the SYSTEM SCROLL menu.
2. Pressing the [ENTRY] key while pressing the Center key, select the TEST menu with the Search dial.
3. Turn the search dial clockwise or move the cursor to 816 (RF REC ADJUST MODE) using a cursor [∨] key.
4. Press the cursor [>] key and move the cursor to EXECUTE.
5. Press the cursor [∧] key, then execute.
   The RF REC ADJUST screen shown in Fig. 3-4 is displayed on the FL panel.
   Press the [SHIFT] key to display each menu. Select the desired menu using [F1] through [F4] keys.

How to Exit the Menu Mode

Press the [SET UP] key to return to the control panel's initial screen. Press this key again.
The display can then return to the RF REC ADJUST test menu screen (screen in step 3).

Explanation of Display



NOTE : The function display in the function key changes as follows every time the [SHIFT] key is pressed :

- Display when the [SHIFT] key is not pressed : FUNCTION 0 display
- Display when the [SHIFT] key is pressed once in a FUNCTION 0 display : FUNCTION 1 display

Function Key	Display	Function	Setting
F1	REC-A	CH-A Recording Current Adjustment	UNITY / VAR
F2	REC-B	CH-B Recording Current Adjustment	UNITY / VAR
F3	REC-C	CH-C Recording Current Adjustment	UNITY / VAR
F4	REC-D	CH-D Recording Current Adjustment	UNITY / VAR
SHIFT, F1	RESPONSE	Error Rate Display Mode Select	FAST / SLOW
SHIFT, F2	SAVE	RF Control Data Save	
SHIFT, F3	REC TEST	REC TEST Menu	ON / OFF
SHIFT, F4	TRANSPT	Servo System ON / OFF	ENABLE / DISABLE

FUNCTION 0 display

F1 : CH-A Recording Current Adjustment
F2 : CH-B Recording Current Adjustment
F3 : CH-C Recording Current Adjustment
F4 : CH-D Recording Current Adjustment

Press the F1 through F4 keys. The display in brackets [ ] on the screen is inverted corresponding to each key. The channels above can be then specified. Press the F1 through F4 keys again. The display goes off. Only the specified channel is adjusted.
The adjustment above can be performed when the Center key is pressed and when the inversion block is set to VAR.
For the adjustment, refer to Section 13, RF Signal System Adjustment.

FUNCTION 1 display

F1 : RESPONSE

This key is used for selecting a response speed for the CHANNEL CONDITION display (error rate display of each channel). Response speed setting is changed from "FAST" to "SLOW" and vice versa every time this key is pressed.

FUNCTION 1 display

[F2] : SAVE

The control data written in NOVRAM is transferred to the nonvolatile memory (NOVRAM) when this key is pressed.
The data changed by the recording current adjustment cannot be written in NOVRAM as it is. Therefore, to write the value after adjustment in UNITY, transfer the control data to NOVRAM. The data transfer is performed by the following procedure :

1. Press the [F2] (SAVE) key. The display appears in the message area on the right of the screen.

   GO TO
   CHECKER MENU
   (807)
   AND
   PUSH F4 (NVW)

2. Press the [SET UP] key, then press the [SHIFT] key while holding down the [SET UP] key.
3. Press the cursor [v] key or turn the search dial and move the cursor to [807 CHECKER MODE].
4. Press the cursor [>] key and move the cursor to EXECUTE. Press the cursor [^] key, then execute.
5. Press the [F4] (NVW) key, then display the sheet plane of the monitor select key and press the SET key.
6. Press the [F3] (/) key to display the changed address. After confirming the address, press the [F3] (/) key continuously until message "PUSH NVWR SW" is displayed. To stop the operation halfway, press the [SET UP] key.
7. After message "PUSH NVWR SW" is displayed, press switch S71 (NVWR SW) on the SP-15 board (DVR-20 series) or SSP-07 board (DVR-28 series). Data transfer then begins.
8. Confirm that message "READY" is displayed on the control panel. Data transfer is then completed. Turn the unit power off. When the unit is powered on again, the UNITY value changes.

FUNCTION 1 display

[F3] : REC TEST

The REC TEST mode is set when this key is pressed while the F4 (TRANSPT) key shows the DISABLE display.
The REC TEST display can be then selected ON or OFF.

FUNCTION 1 display

[F4] : TRANSPT

When this key is pressed, the display changes from ENABLE to DISABLE. The display below then appears on the right of the screen.

READY FOR
REC TEST

When DISABLE is displayed, the servo system function is disabled and the VTR is ready to enter the REC TEST menu.
When this key is pressed with the cassette loaded, an "EJECT CASSETTE" message is displayed on the screen.

3-4. PROC MENU

The PROC (PROCESSOR SYSTEM EE TEST) menu is used for checking and adjusting the video signal system and audio signal system.

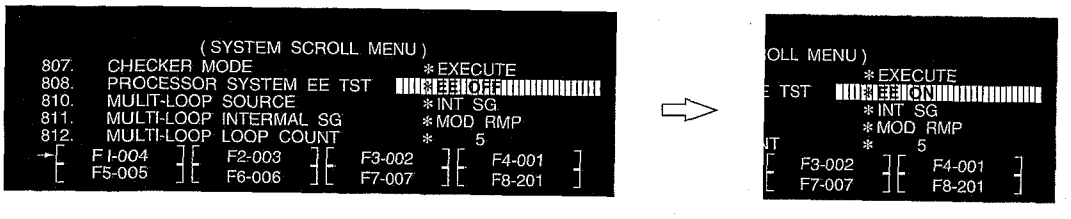
How to Enter the Menu Mode

1. Press the [SET UP] key while pressing the [SHIFT] key.
   Select the SYSTEM SCROLL menu.
2. Pressing the [ENTRY] key while pressing the Center key, select the TEST menu with the Search dial.
3. Turn the search dial clockwise or move the cursor to 808 (PROCESSOR SYSTEM EE TEST) using a cursor [V] key.
4. Press the cursor [>] key and move the cursor to EE OFF.

How to Exit the Menu Mode

Press the [SET UP] key to return to the control panel's initial screen. Press this key again.
The display can then return to the PROCESSOR SYSTEM EE test menu screen (screen in step 3).

Explanation of Display



Press the cursor [^] key. The display changes from ON to OFF and vice versa.

ON : Used to check the EE output signal (SYSTEM EE) of video and audio signal systems.
If another menu is entered, it is automatically switched to OFF.

OFF : Used to check a normal signal.

3-5. MULTI-LOOP TEST

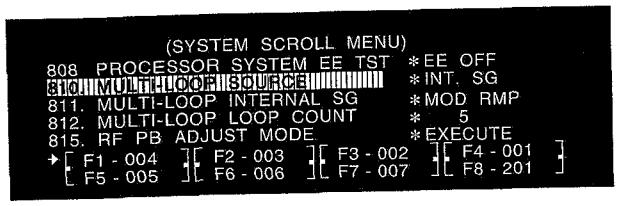
When A / D or D / A conversion is repeatedly performed during editing, video signals gradually deteriorate and distortion increases. In order to minimize this distortion, a dummy loop circuit that is the same as the analog dubbing process can be created and the video signals can be passed through this circuit 5, 10, or 20 times to adjust the setup level, video level, chroma level, and hue.

How to Enter the Menu Mode

1. Press the [SET UP] key while pressing the [SHIFT] key.
   Select the SYSTEM SCROLL menu.

2. Pressing the [ENTRY] key while pressing the Center key, select the TEST menu with the Search dial.

3. A multi-loop test is operated in the three modes below.
   810 MULTI-LOOP SOURCE
   811 MULTI-LOOP INTERNAL SG
   812 MULTI-LOOP LOOP COUNT



Four types of modes below are available to execute a multi-loop test.

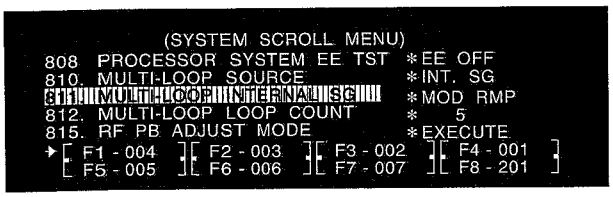
- When adjusting without recording on the tape using INT SG as the reference signal (Section 3-5-1)
- When adjusting while recording on the tape using INT SG as the reference signal (Section 3-5-2)
- When adjusting without recording on the tape using signals recorded on the tape (Section 3-5-3)
- When adjusting while recording on the tape using signals recorded on the tape (Section 3-5-4)

3-5-1. When Adjusting without Recording on the Tape Using INT SG as the Reference Signal

1. Input an ANALOG OUTPUT VIDEO connector output signal to the ANALOG VIDEO INPUT connector. When performing the adjustment using a switcher, input the output signal to the ANALOG VIDEO INPUT connector via the switcher.

2. Select the TEST menu. Turn the search dial clockwise or move the cursor to 811 (MULTI-LOOP INTERNAL SG) using a cursor [v] key.

   NOTE : Confirm that the [MULTI-LOOP SOURCE] menu is selected to "INT SG".



3. Press the cursor [>] key and move the cursor to the right. The type of signals can be selected every time the cursor [^] key is pressed. In this menu, the signal selected using a cursor [^] key is input irrespective of the [202 VIDEO INPUT SELECT] setting in a VIDEO IN / OUT menu. This setting is stored even if the power is turned off.

4. Select the desired signal using a cursor [^] key. (The signal source selected by this setting does not affect VIDEO IN.) MODULATED RAMP is set at the factory. After MODULATED RAMP is selected, press the cursor [<] key.

5. Press the cursor [v] key to select [812 MULTI-LOOP LOOP COUNT]. Press the cursor [>] key to execute [812 MULTI-LOOP LOOP COUNT]. Then, select the desired number of loop times.
   In this loop, the system having the same characteristic as that of analog dubbing is connected by EE, and signals are input from VIDEO OUT to VIDEO IN and circulated at the rate of one generation per every field.

6. Press the [ENTRY] key to start a multi-loop test. The [ENTRY] key blinks during multi-loop test execution.

7. Enter the VIDEO OUTPUT menu to execute various adjustments.

8. To terminate the multi-loop test, press the tape transport function button such as STOP or PLAY.
   This test is also terminated when a tape transport function command is issued from REMOTE.

9. Press the [ASM] (ASSEMBLE) button or [INS] (INSERT) button during multi-loop test execution, then press the [REC / EDIT] button. Signals can be recorded on tape. (Refer to Section 3-5-2.)

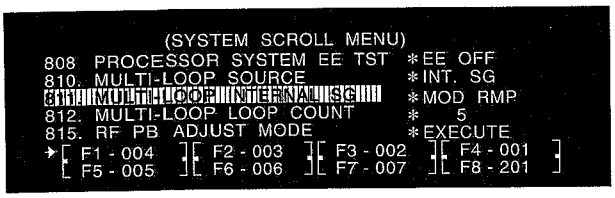
10. After adjustment is completed, the input signal of the ANALOG VIDEO INPUT connector is returned to an ordinary signal.

3-5-2. When Adjusting While Recording on the Tape Using INT SG as the Reference Signal

1. Input an ANALOG OUTPUT VIDEO connector signal to the ANALOG VIDEO INPUT connector. When performing the adjustment using a switcher, input the output signal to the ANALOG VIDEO INPUT connector via the switcher.

2. Select the TEST menu. Turn the search dial clockwise or move the cursor to 811(MULTI-LOOP INTERNAL SG) using a cursor [v] key.

   NOTE : Confirm that the [MULTI-LOOP SOURCE] menu is selected to "INT SG".



3. Press the cursor [>] key and move the cursor to the right. The type of signals can be selected every time the cursor [^] key is pressed. In this menu, the signal selected using a cursor [^] key is input irrespective of the [202 VIDEO INPUT SELECT] setting in a VIDEO IN / OUT menu. This setting is stored even if the power is turned off.

4. Select the desired signal using a cursor [^] key. (The signal source selected by this setting does not affect VIDEO IN.) MODULATED RAMP is set at the factory. After MODULATED RAMP is selected, press the cursor [<] key.

5. Press the cursor [v] key to select [812 MULTI-LOOP LOOP COUNT]. Press the cursor [>] key to execute [812 MULTI-LOOP LOOP COUNT]. Then, select the desired number of loop times. In this loop, the system having the same characteristic as that of analog dubbing is connected by EE, and signals are input from VIDEO OUT to VIDEO IN and circulated at the rate of one generation per every field.

6. Press the [ASM] (ASSEMBLE) button or press the [INS] (INSERT) button to select ASSEMBLE or INSERT mode. To enter CRASH REC mode, this selection is not required.

7. Thread a tape.

8. Press the [REC / EDIT] button (ASSEMBLE or INSERT) or press the [REC / EDIT] and [PLAY] buttons (CRASH REC) simultaneously to start a multi-loop test. When the ASSEMBLE or INSERT mode is selected, a series of PREROLL, PLAY, and REC operations are automatically executed so that the tape position where the [REC / EDIT] button is pressed becomes the record starting point. The [ENTRY] key blinks during multi-loop test execution.

9. Enter the VIDEO OUTPUT menu to execute various adjustments.

10. To terminate the multi-loop test, press the [STOP] or [EJECT] button.
    This test is also terminated when a tape transport function command is issued from REMOTE.

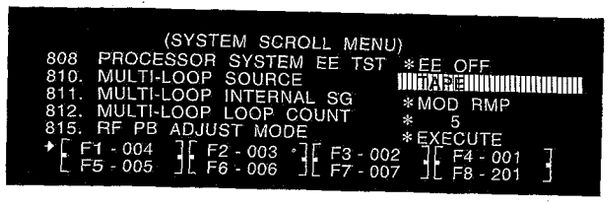
11. After adjustment is completed, the input signal of the ANALOG VIDEO INPUT connector is returned to an ordinary signal.

3-5-3. When Adjusting without Recording on the Tape Using signals Recorded on the Tape

1. Input an ANALOG OUTPUT VIDEO connection output signal to the ANALOG VIDEO INPUT connector. When performing the adjustment using a switcher, input the output signal to the ANALOG VIDEO INPUT connector via the switcher.

2. Install the prerecorded tape that has the record signal to be used as the reference signal.

3. Select the TEST menu. Turn the search dial clockwise or move the cursor to 810 (MULTI-LOOP SOURCE) using a cursor [V] key. Press the cursor [>] key, then press the cursor [^] key to select "TAPE".



4. Press the cursor [V] key to select [812 MULTI-LOOP LOOP COUNT]. Press the cursor [>] key to execute [812 MULTI-LOOP LOOP COUNT]. Then, select the desired number of loop times. In this loop, the system having the same characteristic as that of analog dubbing is connected by EE, and signals are input from VIDEO OUT to VIDEO IN and circulates at the rate of one generation per every field.

5. Find the picture of a desired signal in SHUTTLE, JOG, or PLAY mode.

6. Press the [ENTRY] key to start a multi-loop test. The [ENTRY] key blinks during multi-loop test execution.

7. Enter the VIDEO OUTPUT menu to execute various adjustments.

8. Press the [REC / EDIT] button during multi-loop test execution. Signals can be recorded on tape. (Refer to Section 3-5-4.)

9. To terminate the multi-loop test, press the tape transport function button such as STOP and PLAY. This test is also terminated when a tape transport function command is issued from REMOTE.

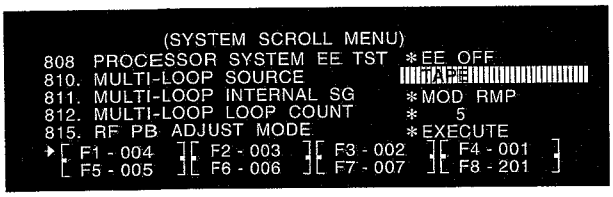
10. After adjustment is completed, the input signal of the ANALOG VIDEO INPUT connector is returned to an ordinary signal.

3-5-4. When Adjusting While Recording on the Tape Using signals Recorded on the Tape

1. Input an ANALOG OUTPUT VIDEO connector output signal to the ANALOG VIDEO INPUT connector. When performing the adjustment using a switcher, input the output signal to the ANALOG VIDEO INPUT connector via the switcher.

2. Install the prerecorded tape that has the recorded signal to be used as the reference signal.

3. Select the TEST menu. Turn the search dial clockwise or move the cursor to 810 (MULTI-LOOP SOURCE) using a cursor [v] key. Press the cursor [>] key, then press the cursor [^] key to select "TAPE".



4. Press the cursor [v] key to select [812 MULTI-LOOP LOOP COUNT]. Press the cursor [>] key to execute [812 MULTI-LOOP LOOP COUNT]. Then, select the desired number of loop times. In this loop, the system having the same characteristic as that of analog dubbing is connected by EE, and signals are input from VIDEO OUT to VIDEO IN and circulated at the rate of one generation per ever field.

5. Find the picture of a desired signal in SHUTTLE, JOG, or PLAY mode.

6. Press the [ASM] (ASSEMBLE) button or [INS] (INSERT) button to select the ASSEMBLE or INSERT mode.
When "TAPE" is selected in a 810 MULTI-LOOP SOURCE menu, CRASH REC is inhibited.

7. Press the [REC / EDIT] button (ASSEMBLE or INSERT) or press the [REC / EDIT] and [PLAY] buttons (CRASH REC) simultaneously to start a multi-loop test. When the ASSEMBLE or INSERT mode is selected, a series of PREROLL, PLAY, and REC operations are automatically executed so that the tape position where the [REC / EDIT] button is pressed becomes the record starting point. The [ENTRY] key blinks during multi-loop test execution.

8. Press the [ENTRY] key to start a multi-loop test. The [ENTRY] key blinks during multi-loop test execution.

9. Enter the VIDEO OUTPUT menu to execute various adjustments.

10. To terminate the multi-loop test, press the tape transport function button such as STOP or PLAY.
This test is also terminated when a tape transport function command is issued from REMOTE.

11. After adjustment is completed, the input signal of the ANALOG VIDEO INPUT connector is returned to an ordinary signal.

3-6. CHECKER MENU

This menu consists of three sections (SP, SV, and UC). Test mode can be executed by entering the desired test mode command in each section. (Refer to Section 3-6-7, Checker Menu Chart.)

This menu is used when adjusting the servo system and tape transport system.

NOTE 1 : Be careful not to use the test mode not described in this manual. If the test mode is used, the corresponding operation cannot be guaranteed. To return to the normal state, turn the power on again.

NOTE 2 : Pay careful attention to the adjustments in this menu referring to Section 9, Tape Transport System Alignment and Section 10, Servo System Alignment. If several adjustments are incorrectly made in this menu, good-quality video and audio outputs may not be obtained or the tape or VTR mechanism system may be damaged.

How to Enter the Menu Mode

Press the keys on the control panel in the following sequence :

1. Press the [SET UP] key while pressing the [SHIFT] key.
   Select the SYSTEM SCROLL menu.
2. Pressing the [ENTRY] key while pressing the Center key, select the TEST menu with the Search dial.
3. Turn the search dial clockwise or move the cursor to 807 (CHECKER MODE) using a cursor [∨] key.
4. Press the cursor [>] key and move the cursor to EXECUTE.
5. Press the cursor [∧] key, then execute.
6. Enter each command using a function key or monitor select key.
   For how to enter commands, refer to the description below.

How to Exit the Menu Mode

Press the [SET UP] key to return to the control panel's initial screen. Press this key again.
The display can then return to the CHECKER MODE test menu screen (screen in step 3).

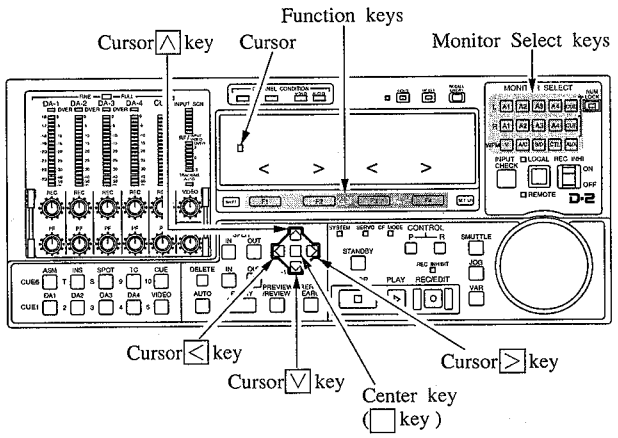
3-6-1. Key's Description

Function Keys

[F1] (ALPH SET) : Used to enter an alphabetic character. Turn the search dial, specify the alphabetic character in the upper right of the display screen, then press this key. The specified alphabetic character is then entered.
[F2] ($) : Press to enter "$".
[F3] (/) : Used as a space key. (Advances to the next address for $ and $$ commands.)
[F4] (NVW) : Used to write data in NOVRAM.

The function of the function key when the [SHIFT] key is pressed changes as described below (not including the [F1] key).

[F2] (WINDOW) : Moves the display area on the screen right and left. (The blink cursor moves right and left.)
[F3] (BOARD) : Selects the SP, SV, and UC test modes.
To split this menu into SP, SV, and UC sections, press the [SHIFT] key.
The illustrated portion (< >) of the screen in the area where the cursor blinks is selected every time the [F3] (BOARD) is pressed.
The displayed section is set in this case.



[F4] (=) : Press to enter "=".

Monitor Select Key

The monitor select key is used to enter a command or data.
How to enter the command or data is explained by the display described on the sheet plane of the monitor select key.
To specify a numeric character and alphabetic character in a CHECKER menu using the monitor select key, use the sheet plane display of the monitor select key.

To enter an alphabetic character using the monitor select key, press the corresponding numeric key while holding down the [INPUT CHECK] button.

NOTE : the [NUM LOCK] key is not used.

The numeric character and its corresponding alphabetic character are shown in the table below.

1	2	3	4	5	6	7	8	9	0
B	C	D	E	F					A

[SET] : Used when entering a command or data.
[+] : Used as a space key. (Advances to the next address for $ and $$ commands.)
[−] : Deletes one character before the cursor. (Returns to the previous address for $ and $$ commands.)
[CLR] : Not operate.

Cursor Key

In a servo checker, the cursor keys are used as function keys. The function is determined by the combination of three cursor keys, [<], [<], and [ ] (Center).
For explanations in this section, the cursor keys are referred to as f0 through f3.

f0 : [ ] + [<]
f1 : [<]
f2 : [>]
f3 : [ ] + [>]

NOTE : For f0 and f3, press the [ ] key and [<] key or [>] key at the same time.
However, when some of test commands are executed, each function is determined as the key is released.
Therefore, release the [<] or [>] key before releasing [ ] key.

3-6-2. List of Commands

Session	Command	Function	Page
SP	$, $$	Rewrites memory data.	P. 3-35
	= 0	Resets the system.	P. 3-25
	NVW	Transfers the rewritten data to NOVRAM.	P. 3-26
	E	Enables the E test mode	P. 3-27 ~ 3-34
	F	Enables the F test mode	P. 3-35 ~ 3-64
SV	$, $$	Rewrites memory data.	P. 3-67
	= 0	Resets the system.	P. 3-68
	B	Enables the B test mode	P. 3-69 ~ 3-70
	C	Enables the C test mode	P. 3-71 ~ 3-88
	D	Enables the D test mode	P. 3-89 ~ 3-123
UC	$, $$	Rewrites memory data.	P. 3-126
	= 0	Resets the UC board.	P. 3-127
	B	Enables the B test mode	P. 3-128 ~ 3-131
	C	Enables the C test mode	P. 3-132 ~ 3-136
	D	Enables the D test mode	P. 3-137 ~ 3-139
	E	Enables the E test mode	P. 3-140 ~ 3-149
	F	Enables the F test mode	P. 3-150 ~ 3-155

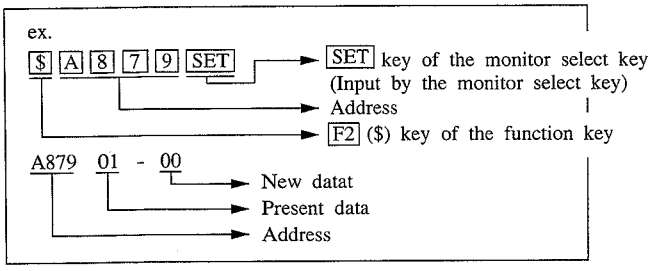
3-6-3. Example of Command Usage

(1) When rewriting memory data ; SP session $ ($$) command, SV session $ ($$) command and UC session $ ($$) command

Select the CHECKER menu according to "How to Enter the Menu Mode" in Section 3-6.

How to enter one-byte data

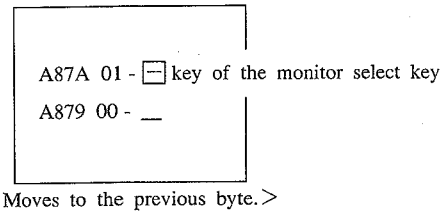
Change the data in address A879 to "00H". As the current data is displayed on the control panel, enter new data.



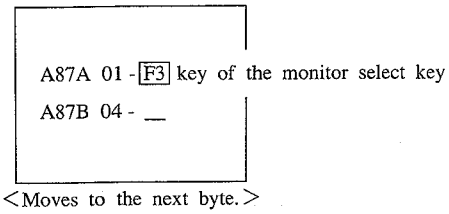
As soon as data entry is completed, the cursor is moved to the position ready for the next byte of data.

How to proceed to the next operation

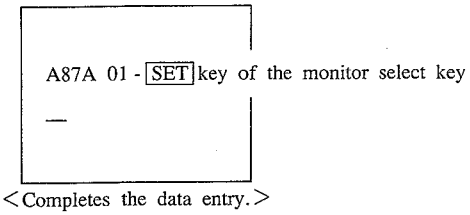
Return to the previous byte : Press the [–] key of the monitor select key.
Advance to the next byte : Press the [F3] (/) key of the function key.
Complete the data entry : Press the [SET] key of the monitor select key. (Enters the command entry wait state.)



<Moves to the previous byte.>



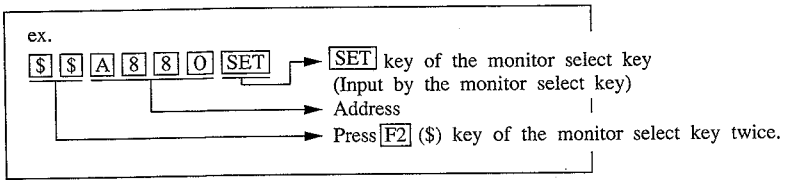
<Moves to the next byte.>



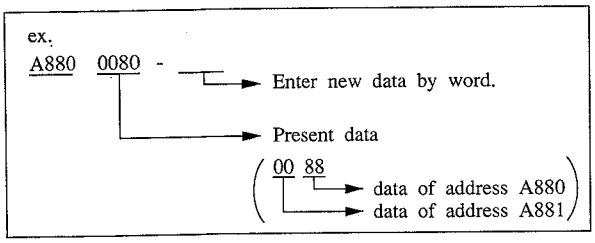
<Completes the data entry.>

How to enter one-word data

To rewrite data in one word, enter in the command entry wait state as follows :



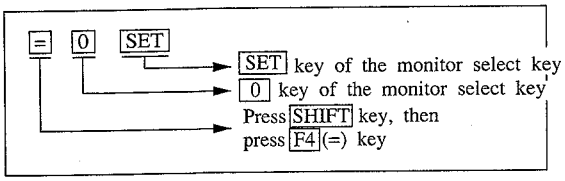
The control panel display is as shown below.



The key operation is performed in the same way as for one-byte entry.

(2) System reset : SP session = 0 command and SV session = 0 command

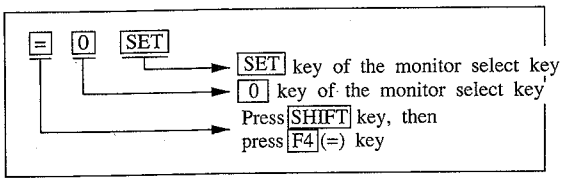
The system is reset to the same state as that when the power is turned on or when the CPU reset switch on the SP-15 or SSP-07 board is pressed.
If this command is executed before the data is transferred to NOVRAM, the data changed by a $ or $$ command is lost.
Select the SP or SV test mode using a function key and enter using a [=], [0], then [SET] key.



The system is reset at that time.

(3) UC reset : UC session = 0 command

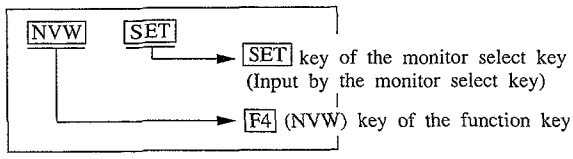
The UC board is reset to the same state as that when the power is turned on.
Select the UC test mode using a function key and enter using a [=], [0], then [SET] key.



The UC board is reset at that time.

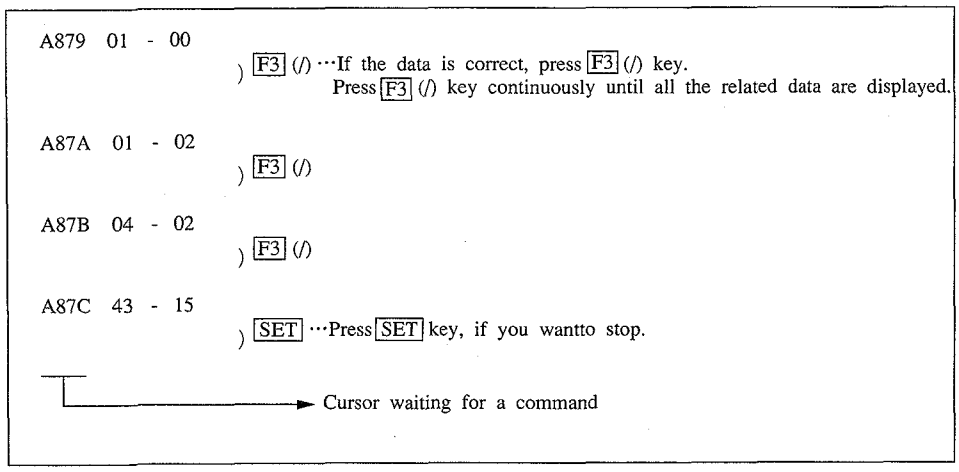
(4) Transfer of rewritten data to NOVRAM: SP session NVW command

The data changed by a $ or $$ command is lost when the system is reset or when the power is turned on again.
To store the rewritten data, execute this command.
However, if you rewrite data, the original data is lost. Do not change the data thoughtlessly.
Select the SP test mode using a function key and enter using a [NVW] key, then [SET] key.



NOTE : When "BASE SUM ERROR" is first displayed, it indicates that NOVRAM is faulty.
Confirm all the data items or replace NOVRAM.

The address in which data is changed, the data before change, and the data after change are displayed.
If the address and data are correct, press the [F3] (/) key. To stop the write, press the [SET] key. If the data in any unwanted address is changed, stop the write.



After all the changed data items have been displayed, "PUSH NVWR SW" is displayed on the control panel. Press the NOVRAM WRITE switch (S71) on the SP-15 or SSP-07 board. Data transfer is started.
When data transfer is completed, "READY" is displayed. The NVW command is then terminated.
When there is no changed data, "READY" is displayed. The NVW command is then terminated.